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B400

Service Manual

EN

Service Instructions for the B400 Wheelchair

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1 General information

INFORMATION

Date of last update: 2013-06-14

- Please read this document carefully.
- Follow the safety instructions.

1.1 Foreword

This service manual describes all regular maintenance tasks as well as repair and replacement tasks for the B400 from year of manufacture 2013. It includes all information required by dealers in order to correct functional and mechanical defects in components of the B400.

The information in this service manual is essential in order to work on the B400 correctly and safely. This is why this document, in particular the section "Safety instructions", must be read carefully by all persons working on the B400. This ensures that the functionality of the B400 is fully utilised.

1.2 Intended use

The B400 power wheelchair is intended as a means of conveyance in indoor and outdoor areas for individuals with limited mobility. The B400 power wheelchair may only be used by persons who have the required physical and mental capabilities.

Any other use is considered improper use. The manufacturer is not liable for any personal injury or damage to property resulting from improper use; the user has sole liability in such cases.

The B400 power wheelchair may only be used by appropriately trained persons. Training is one of the prerequisites in order to protect against personal risks and to operate the B400 power wheelchair safely and properly.

2 Safety instructions

2.1 Explanation of symbols

⚠ WARNING	Warnings regarding possible risks of severe accident or injury.
⚠ CAUTION	Warnings regarding possible risks of accident or injury.
NOTICE	Warnings regarding possible technical damage.
INFORMATION	Information regarding operation. Information for service personnel.

2.2 Standards and directives

All safety information contained in these service instructions refers to the currently valid national laws and regulations of the European Union. In other countries, compliance with the applicable laws and national regulations is required.

In addition to the safety instructions contained in these service instructions, the user is required to observe and comply with the BGV (Employer's Liability Insurance Association regulations), UVV (accident prevention regulations) and environmental protection regulations. All information contained in these service instructions must be complied with at all times without restrictions.

The B400 power wheelchair has been constructed in accordance with state-of-the-art technology and is safe to operate. The safety of the B400 power wheelchair has been confirmed by CE certification and the declaration of conformity.

2.3 General safety instructions

INFORMATION

Regular maintenance is important – it improves safety and increases the lifespan of the product.

⚠ CAUTION

Risk of suffocation. Packaging materials must be kept out of reach of children.

NOTICE

Risk of damage due to unauthorised service. Service and maintenance work may only be completed by qualified personnel. Only original spare parts may be used for all service and maintenance tasks.

NOTICE

Risk of damage caused by not adhering to maintenance intervals. The manufacturer recommends having the B400 power wheelchair inspected and maintained for functionality and operational safety by authorised qualified personnel once a year. In case of frequent user changes (growing children or youths) or users with changing clinical pictures, the wheelchair should be inspected, adjusted and maintained twice a year.

NOTICE

Risk of damage caused by failure to comply with the service documentation. Knowledge of the service instructions and the instructions for use is a prerequisite for proper service.
The service and maintenance instructions must be read carefully before commencing work. The service manual applies in conjunction with the instructions for use and the spare parts catalogue. All documents must be used together.
All safety instructions contained in this service manual and all other applicable documents must be observed and complied with. They must be available to service and maintenance personnel at all times.

NOTICE

Risk of damage due to excessive heat or cold. The B400 may only be operated in the temperature range from -25°C to +50°C. It must not be operated at temperatures outside this range.

NOTICE

Risk of damage due to overloading. The maximum load capacity for the B400 power wheelchair is 140 kg.

INFORMATION

Familiarise yourself with the functions of the product. If you are not familiar with the product, read the instructions for use before testing it. The instructions for use are available from the manufacturer (see overview of all Ottobock subsidiaries under "Ottobock Worldwide"). Additional documentation can be downloaded from the manufacturer's website at www.ottobock.de or www.ottobock.com.

2.4 Safety instructions for the use of tools and accessories

⚠ CAUTION

Risk of health impairment due to the use of incorrect tools. When completing the tasks, only use tools that are suitable for the conditions at the place of work and for which safety and the protection of health are assured with proper use.
Verify proper functionality before use. For use of the work equipment, the ergonomic relations between the workplace, work equipment, work organisation, workflow and task must be taken into consideration; this especially applies to the body posture assumed when using the work equipment.

⚠ CAUTION

Health risks due to the use of improper work clothing. Ensure that legally prescribed protective work clothing is worn.

⚠ CAUTION

Risk of injury during tasks that involve lifting. When repair and maintenance tasks must be completed under raised parts or equipment, ensure suitable precautions are taken to secure the applicable components against falling. Equipment used to raise loads must prevent the load from accidentally shifting in a dangerous manner, dropping in free fall or being accidentally released.
When using lifting platforms, ensure that the B400 power wheelchair is centred on the platform and that the anti-tipper and other parts are not protruding into the danger zone.

⚠ CAUTION

Risk due to hazardous working substances. Hazardous materials may only be kept at the place of work in quantities required for ongoing tasks. Regularly and safely remove waste and residue. Clean up spilled substances immediately.

2.5 Safety instructions for maintenance work

⚠ CAUTION

Risk of injury due to pinch points. For design reasons, there are pinch points between the seat and frame of the B400. Special caution is required during all work on the corresponding components.

⚠ CAUTION

Hazards when work being carried out on the brake system. Note that there is no braking functionality when the wheel lock is unlocked. The brake must only be unlocked in hazardous situations and for maintenance or repairs. The corresponding force required for acceleration and deceleration must come from the person pushing.
Once push mode is no longer needed, the brake unlocking lever must be locked immediately.

NOTICE

Risk of damage due to improper preparation for maintenance work.
- The B400 power wheelchair must be turned off and the fuse must be removed for all maintenance tasks. Functional tests of the electrical components are excepted from this rule.
- Secure the product to prevent it from tipping over or falling, e.g. off the workbench.
- Some parts of the power wheelchair such as the batteries, frame, seat and motors are very heavy. Hoisting devices of sufficient capacity must be used where applicable.
- Clean/disinfect the product before you start testing it. Consult the instructions for use regarding product care and product-specific testing instructions.

NOTICE

Risk of damage due to unsecured screw connections. Unsecured screw connections can become loose when the product is being used. Secure screws and nuts. The screw connections must be tightened properly after all installation tasks. Defined torque specifications must be followed.
Many screw connections utilise screws and nuts equipped with a thread lock. If such screw connections need to be loosened, the nuts or screws must be replaced with nuts/screws supplied with a new thread lock. If new screws or nuts with a thread lock are not available, apply a medium-strength liquid thread locking compound (such as Loctite® 241 or Euro Lock A24.20) to the existing screws.

NOTICE

Risk of damage to the padding. The upholstery must be adequately protected against mechanical and chemical damage during all work on the seat. The backrest and seat bottom are flame retardant but nevertheless flammable. They must not come into contact with open flames or embers.

NOTICE

Risk of damage due to improper cleaning after completion of the maintenance tasks. The B400 may not be cleaned with a jet of water or a pressure washer under any circumstances. A cloth or sponge may be used for cleaning. Water must not come into direct contact with the motor under any circumstances.
Check the driving behaviour of the B400 power wheelchair after cleaning it.

INFORMATION

The tyres of the B400 power wheelchair contain chemical substances that may react with other chemical substances (e.g. cleaning agents, acids, etc.).

2.6 Safety instructions for maintenance work on electrical components

NOTICE

Risk of damage due to improper preparation for maintenance work.

- If the driving function is not required, turn off the control unit or jack up the drive wheels in order to prevent uncontrolled operation through accidental joystick activation.
- When carrying out maintenance work make sure water does not come into direct contact with the electronics or the battery.
- When attaching plug connectors on the controller make sure the contacts are assigned correctly.

⚠ CAUTION

Risk of injury when work being carried out on the battery. Only use Ottobock battery chargers which have been tested and approved for use with the given batteries by the manufacturer (observe information on battery charger). Failure to do so can result in a battery explosion and endangerment to health due to contact with battery acid.
Smoking and open flames are prohibited while working on the batteries. Sparks must be avoided.
Drive batteries can supply very large amounts of energy and may arc if they are short-circuited. Therefore, always disconnect the batteries when working on the motor control or wiring.

NOTICE

Risk of battery damage. In order to prevent short circuits, always use insulated tools when working on the batteries.
Prevent deep discharge of the batteries in order to avoid loss of functionality and permanent battery damage.
Ensure correct polarity when connecting the batteries.

NOTICE

Risk of damage to the battery charger. Prevent overheating of the charger during the charging process. Ensure that the cooling fins on the back of the device are not covered.

INFORMATION

The B400 has been tested according to EMC regulations. The following particularities must be observed during operation and communicated to the user:

- The driving characteristics of the B400 can be affected by electromagnetic fields (mobile phones or other radiating devices). Therefore all mobile devices must be turned off when driving.
- The B400 can generate electromagnetic fields which can lead to interference with other devices. Therefore, the control unit must be switched off whenever it is not needed.

INFORMATION

During extended periods of disuse or shipment of the B400 power wheelchair, remove the fuse from the fuse holder to prevent deep discharge of the batteries due to standby consumption.

2.7 Safety instructions for disposal

INFORMATION

If the power wheelchair is no longer in use, it must be disposed of properly in accordance with national regulations.
All components and materials of the power wheelchair must be recycled or disposed of properly.

⚠ CAUTION

Risk of polluting the environment with battery acid. The batteries of the power wheelchair contain a toxic acid. They must not be disposed of with regular domestic waste and the battery acid must not enter the sewage system or penetrate into the ground. The instructions of the battery manufacturer printed on the batteries must be observed.

3 Transport and storage

The following environmental conditions apply to transport and storage:

Ambient temperature -40 °C to +65 °C

3.1 Transport

⚠ CAUTION

Risk of accidents due to insufficient fastening. Properly fasten the B400 power wheelchair to the transport vehicle, e.g. with tensioning straps, to secure it against shifting.

NOTICE

Risk of damage due to falling. The maximum net weight of the B400 power wheelchair is 95 kg (with seat height adjustment option: + 20 kg). Only use hoists and transport means of sufficient capacity for transport.

Secure the B400 power wheelchair to the means of transport, e.g. with tensioning straps. Use the eyebolts at the front and back of the power wheelchair and the defined anchor points in the transport vehicle.

Before transporting the power wheelchair, switch off the control unit and engage the brake.

You can reduce the size of the power wheelchair for transport by folding down the back rest and removing the side panels and footrests.

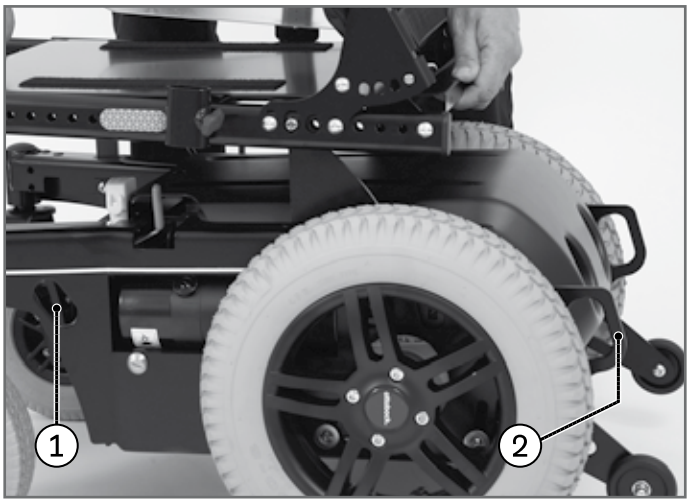


Fig. 1 Eyebolts

1 Eyebolts, front
2 Eyebolts, rear

3.2 Storage

INFORMATION

If the B400 power wheelchair is not moved for several days, permanent colour changes may occur in the regions where the wheelchair is in contact with the support surface. The manufacturer thus recommends ensuring that a suitable surface is provided if the wheelchair is to be parked for extended periods of time.

The B400 power wheelchair must be stored in an enclosed room. Remove the main fuse as otherwise there is a risk of deep discharge.

The storage location must be dry and have sufficient air circulation. Humidity must not build up. The B400 power wheelchair must not be subjected to any damaging exterior influences, e.g. rain, snow or strong solar radiation, during storage.

The manufacturer recommends storing the B400 power wheelchair with slightly elevated tyre pressure and using assembly stands or wooden blocks in order to raise the tyres (completely) off the ground in order to protect them from ground frost. Regularly rotating the wheels helps prevent flat spots.

4 Required tools and accessories

Suitable tools and aids for the completion of service tasks are listed below.

- ❒ Straight and Phillips screwdrivers
- ❒ Ring or open-end spanners, sizes: 8 – 24
- ❒ Allen wrenches, sizes: 2, 3, 4, 5, 6, 7
- ❒ Torque spanner
- ❒ Socket, size: 19
- ❒ Pin punch, Ø 3 mm
- ❒ Plastic hammer
- ❒ Drill bit, size 4/6 mm + hand drill
- ❒ Plastic tyre lever
- ❒ Inner tube repair kit
- ❒ Side cutting pliers
- ❒ Water pump pliers, gripping width up to 32 mm
- ❒ Liquid thread lock "medium strength"

Fig. 2Tools

Fig. 3Hand-held programming device

5 Information display

INFORMATION

For error indication information with the LED display "Battery capacity" or with the aid of the hand-held programming device/PC software, please refer to section 7 "Diagnostics".

The wheelchair functions are displayed on the LED display fields of the control panel:

LED display	Function
"Battery capacity"	The LEDs show the battery capacity (see instructions for use 647G485).
"Speed levels"	The LEDs show the currently selected speed level (from 1 to 5).

Table 1 LED display fields on the control panel

6 Service work

6.1 Checking the general condition

- ❒ Check all safety-related components for corrosion, repair if required and reapply corrosion protection.
- ❒ Check weld seams.
- ❒ Check tightness of screw connections; replace thread-locking compound if required; observe any defined tightening torques; replace defective screws (e.g. in case of corrosion).
- ❒ Check cables for ruptures, signs of wear and proper attachment; replace defective components according to the cable layout plan.
- ❒ Check cable connections and plug connections.

6.2 Replacing the fuse

The fuse is in a fuse enclosure with hinged cover in front of the battery cover beside the control unit.

Steps:

1. Flip open the cover of the fuse enclosure.
2. Pull out the fuse and replace it if necessary.

Properly reassemble all components upon completion of the work.

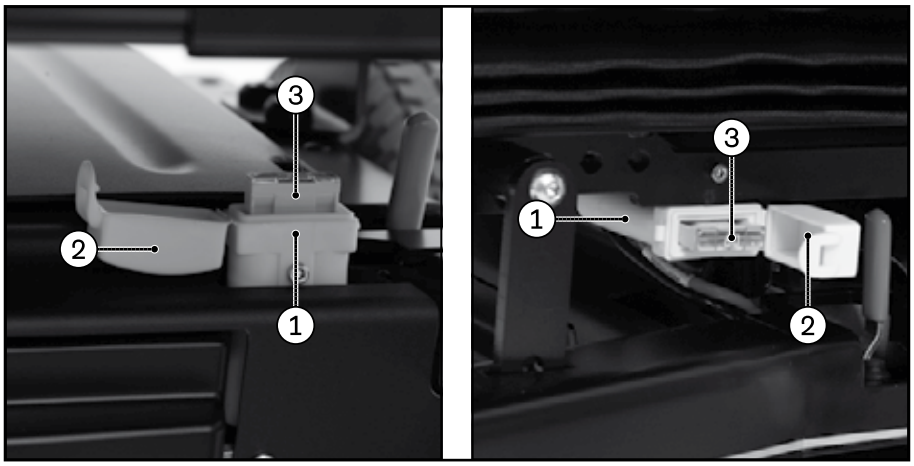


Fig. 4 Replacing the fuse

1 Fuse holder
2 Fuse enclosure cover
3 Fuse

6.3 Batteries

⚠ CAUTION

Risk of injury when work being carried out on the battery. Smoking and open flames are prohibited while working on the batteries. Sparks must be avoided.
Drive batteries can supply very large amounts of energy and may arc if they are short-circuited. Therefore, always disconnect the batteries when working on the motor control or wiring.

NOTICE

Risk of battery damage. In order to prevent short circuits, always use insulated tools when working on the batteries.
Prevent deep discharge of the batteries in order to avoid loss of functionality and permanent battery damage.
Ensure correct polarity when connecting the batteries and state of charge meter.

The standard version of the B400 power wheelchair is equipped with two maintenance-free AGM batteries with a capacity of 50 Ah (C5) or optionally with gel batteries with a capacity of 63 Ah (C5).

6.3.1 Charging the batteries

⚠ WARNING

Risk of injury due to incorrect charging profile adjustment. When switching from AGM to gel batteries, changing the charging profile on the charger is mandatory (see instructions on the charger).

NOTICE

Risk of damage due to incorrect battery handling. Please note the following when handling the batteries:
- Charge the batteries as soon as possible if only one LED is flashing on the "battery capacity" LED indicator.
- Charge the batteries weekly if the B400 power wheelchair is not used for an extended period of time.
- The manufacturer does not assume any liability for damage due to deep discharge.

NOTICE

Risk of damage to or caused by the battery charger. Please note the following when using the charger:
- Only use Ottobock battery chargers which have been tested and approved for use with the given batteries by the manufacturer (observe information on battery charger).
- The information on the name plate of the charger must match the mains voltage in the respective country.
- Only use the battery charger within the specified temperature and humidity limits.
- Place the battery charger on a level surface.
- If you position the battery charger near a window, protect it from direct sunlight.
- Keep the charger from overheating. The vent openings on the back of the charger must not be covered.
- Turn off the control unit during the charging process so that the entire charging current flows to the battery.
- Avoid dust and dirt. Only clean with a dry cloth.

The remaining battery capacity determines the range of the B400 power wheelchair. The following factors influence battery capacity:

❒ Ambient temperature

❒ Age of the batteries

❒ Driving load

❒ Charging method

Prolonged driving at the lower end of the battery indicator results in deep discharge which causes battery damage. In addition, there is the risk that the B400 power wheelchair will stop when the battery is fully discharged and put the user in a dangerous situation.

Tools:

❒ Battery charger provided by Ottobock

Steps:

1. Turn the control unit on the power wheelchair off.
2. Insert the plug of the battery charger into the charging receptacle on the underside of the control panel.
3. Connect the battery charger to a wall outlet. The batteries will start charging automatically, and the current charge status is indicated on the LEDs of the battery charger (see Table 2).
4. When the charging process is finished disconnect the mains plug and the battery charger plug on the control panel.
5. Turn on the control unit; the power wheelchair is now ready to use.

The battery charger indicates the following states:

Display	Function
All LEDs light up for a moment	Once the connection to the mains supply has been established
Yellow LED is lit	Battery is charging
Yellow LED is flashing	Battery is 90% charged
Green LED is lit	Battery is fully charged; battery charger has changed to trickle charge
Red LED is lit	Incorrect polarity (immediately unplug the mains plug and reconnect the cables with correct polarity)
Red LED is flashing	Error in charging profile progression; charging time exceeded

Table 2 LED display on the charger

The battery charger features a programmed recharging phase. Once a discharged battery is completely charged (after approximately 8 hours), the battery charger can remain connected with no risk of overcharging or damaging the battery.

If the power wheelchair will not be used for an extended period of time the manufacturer recommends disconnecting the battery charger and removing the main fuse.

6.3.2 Replacing the batteries

⚠ CAUTION

Risk of injury due to electric current. Always remove the main fuse before doing any work on the batteries.

NOTICE

Risk of battery damage. Ensure correct polarity when connecting the batteries.

Preparation:

❒ Remove the fuse (see section 6.2).

Tools:

❒ Ring or open-end spanner, size 11

Steps:

1. Remove the fuse (see section 6.2).
2. Open the battery cover and remove the cover (see fig. 5).
3. Disconnect all connection cables from the battery.
4. Remove the batteries and replace them if necessary.

Properly reassemble all components upon completion of the work.

Fig. 5 Opening the battery cover

Fig. 6 Disconnecting the connection cables

6.3.3 Reinstalling the battery cable

NOTICE

Risk of battery damage. Ensure correct polarity when connecting the batteries.

Preparation:

❒ Remove the battery cover (see section 6.3.2).

❒ Remove the fuse (see section 6.2).

❒ Remove the batteries (see section 6.3.2).

Tools:

❒ Allen wrench, size 3

❒ Ring or open-end spanner, size 11

Steps:

1. Disconnect the old main battery cable from the controller (for connections on the controller, see fig. 7).
2. Unscrew the fuse holder of the old fuse cable from the frame.

3. Connect the new battery main cable to the controller.
4. Screw the fuse holder of the new fuse cable to the frame.
5. Reinsert/reconnect the batteries.
6. Connect the battery cable at the proper location on the battery.

Properly reassemble all components upon completion of the work.

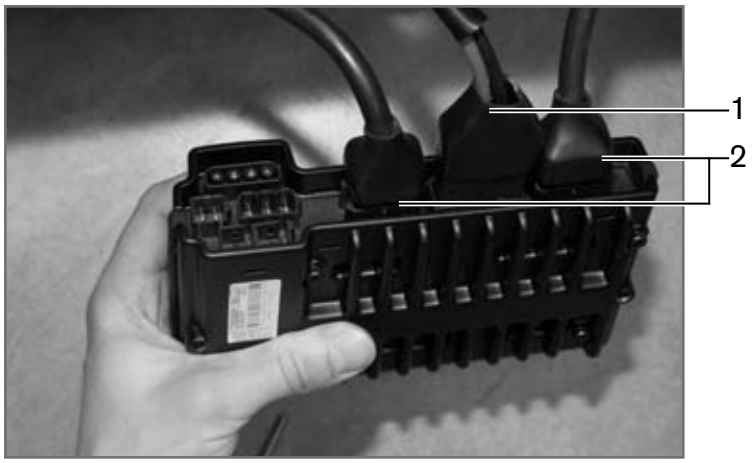


Fig. 7 Controller with connector plugs

1 Main battery cable connector
2 Motor plugs

6.4 Replacing the controller

Replacing the controller is necessary both during replacement and during installation of power seat options or lighting in conjunction with the extended control panel – version A (see section 6.8.1):

❒ Controller standard: 493U65=SK001

❒ Controller, additional power functions: 493U65=SK006 (for controlling actuators for the power seat options)

INFORMATION

When connecting the cables, ensure correct assignment.

INFORMATION

For information about the assembly of the lighting module refer to section 6.8.3.

Preparation:

❒ Remove the battery cover (see section 6.3.2).

❒ Remove the batteries (see section 6.3.3).

❒ Remove the fuse (see section 6.2).

Tools:

❒ Allen wrench, size 3

Steps:

1. Disassemble the protective cover (see fig. 8).
2. Disconnect all connections from the controller.
3. Loosen the two Allen head screws, remove the controller and replace it if required.

Properly reassemble all components upon completion of the work.

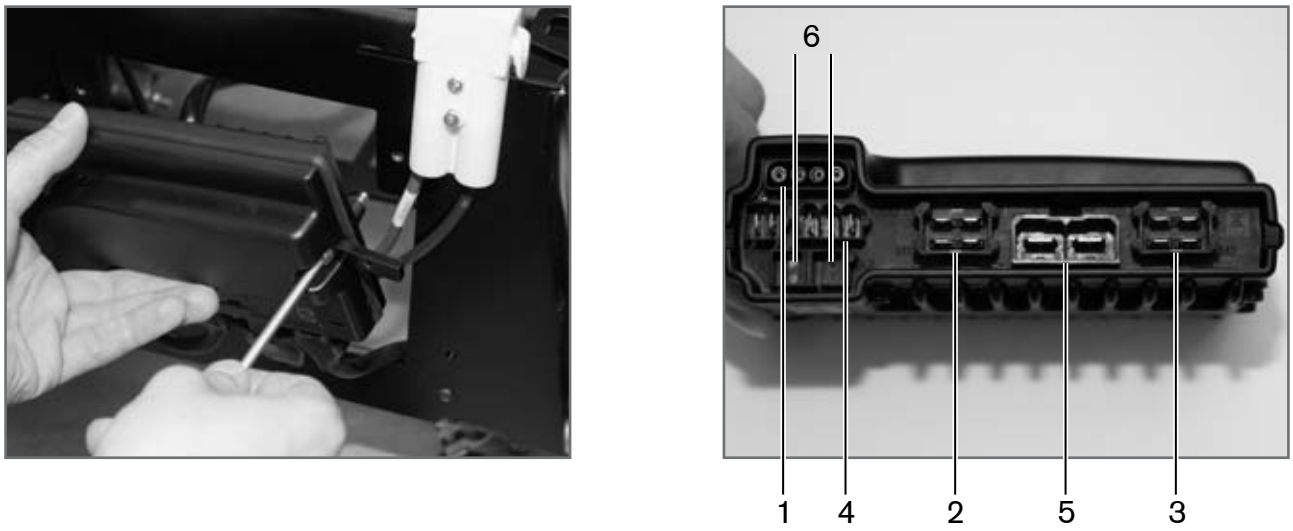


Fig. 8 Removing the protective cover/connectors on the controller

1 Control unit connector
2 Connection for motor 1
3 Connection for motor 2
4 Connection for lights
5 Battery connector
6 Connection, actuator left/right

6.5 Side panels

6.5.1 Adapting/replacing the side panels

Side panel mounting brackets are located on the left and right sides of the seat frame. The side panels with armrests are inserted into these brackets. The heights and positions of the side panels can be individually adapted to the arm length of the wheelchair user.

Tools:

❒ Allen wrench, size 2

a) Adapting to the forearm length

Side panel without control panel:

Steps:

1. Loosen the two Allen head screws (fig. 9, item 1).
2. Change the positions of the armrests by moving them forward or backward, or remove and replace them if required.

Side panel with control panel:

Steps:

1. Loosen the sliding nuts in the C-profile (fig. 9, item 2).
2. Adjust/replace the armrest and tighten the sliding nuts.

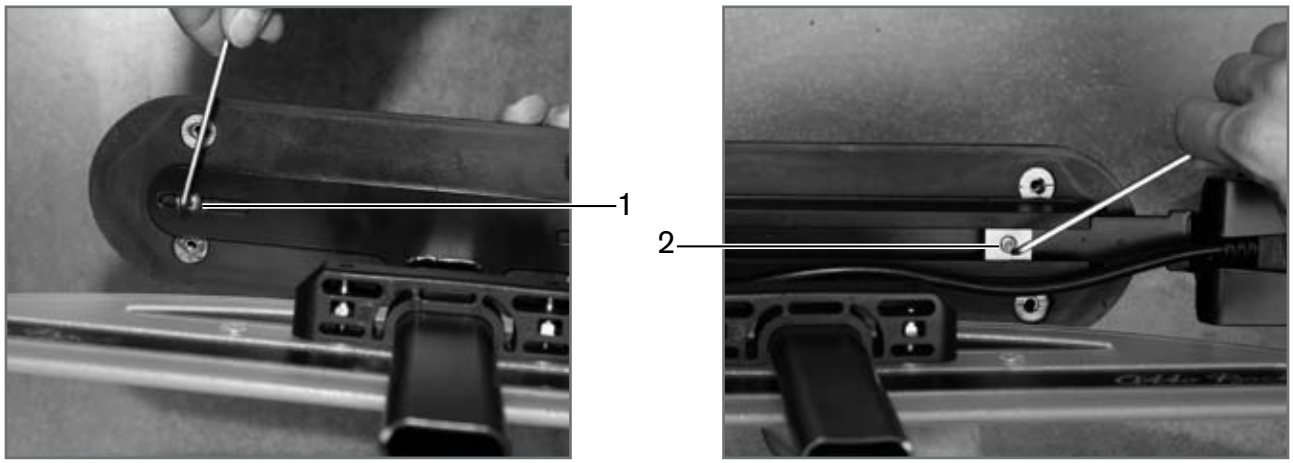


Fig. 9 Adapting the side panel to the forearm length

b) Adapting to the upper arm length

Steps:

1. Loosen the set screw at the top of the side panel mounting bracket.
2. Move the armrest to the required height.
3. Tighten the set screw.

Fig. 10 Adapting the side panel to the upper arm length

c) Replacing the side panel

Steps:

1. Loosen the wing nut laterally at the bottom of the side panel mounting bracket.
2. Pull the side panel up to remove and replace it if required.

Properly reassemble all components upon completion of the work.

Fig. 11 Replacing the side panel

6.5.2 Replacing the clothing protector

Preparation:

❒ Remove the side panel.

Tools:

❒ Allen wrench, size 3

Steps:

1. Loosen two Allen head screws on the side panel.
2. Change the position of the clothing protector, or remove and replace it if required.

Properly reassemble all components upon completion of the work.

Fig. 12 Replacing the clothing protector

6.6 Footrests

6.6.1 Adapting/replacing the footrests

Different footrest systems are available for the B400 power wheelchair, all offering the same setting and attachment options. The lengths and positions of the footrests can be individually adjusted to the wheelchair user.

As an alternative to the standard version, elevating footrests with calf and knee pads may be installed.

Tools:

❒ Allen wrench, size 5

❒ Allen wrench, size 6

❒ Ring or open-end spanner, size 10

a) Adapting to the lower leg length

Steps:

1. Pull the footrest lock lever back and pull the footrest up and out (see fig. 13).
2. Loosen the two set screws (see fig. 14).
3. Adjust the length by pulling out or pushing in the footrest tube.

Properly reassemble all components upon completion of the work.

Fig. 13 Unlocking the footrest

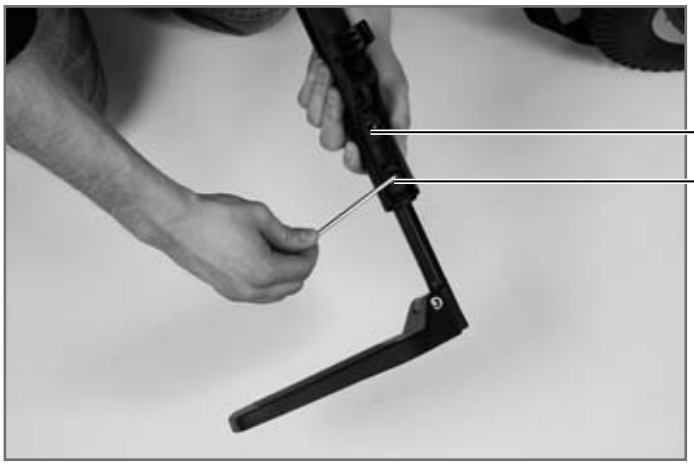


Fig. 14 Adjusting the lower leg length

1 Set screw

b) Adapting to thigh length

This setting is changed on the footrest holder mounted to the seat frame.

Steps:

1. Pull the footrest lock lever back and pull the footrest up and out (see fig. 13).
2. Loosen the two Allen head screws on the back of the adapter.
3. Loosen the two Allen head screws found on each of the left and right sides of the seat frame.
4. Disconnect the footrest tube from the adapter or adjust it to a different length.

Properly reassemble all components upon completion of the work.

Fig. 15 Adapting the footrest to the thigh length

c) Installing elevating footrests with calf and knee pads

Tools:

❒ Allen wrench, size 3

❒ Ring or open-end spanner, size 10

Steps:

1. Remove the standard footrest holder.
2. Install the footrest holder for elevating footrests.
3. Loosen the Allen head screws.
4. Remove and replace the standard footrests.

d) Replacing the knee pad

Steps:

1. Remove the footrest.
2. Loosen the Allen head screw (fig. 16).
3. Remove the knee pad or replace it if required.

Properly reassemble all components upon completion of the work.

Fig. 16 Replacing the knee pad

e) Replacing the calf pad

The calf pad is attached to the footrest tube.

Steps:

1. Remove the footrest.
2. Loosen the Allen head screw.
3. Remove the calf pad or replace it if required.

Properly reassemble all components upon completion of the work.

Fig. 17 Replacing the calf pad

6.6.2 Replacing the footplate

Different footplates are available for the B400 power wheelchair. As an alternative to the standard version with individual footplates, a continuous aluminium footplate may be installed.

Tools:

❒ Allen wrench, size 6

Steps:

1. Loosen the Allen head screw that connects the footplate to the installation kit.
2. Remove the footplate and replace it if required.

Properly reassemble all components upon completion of the work.

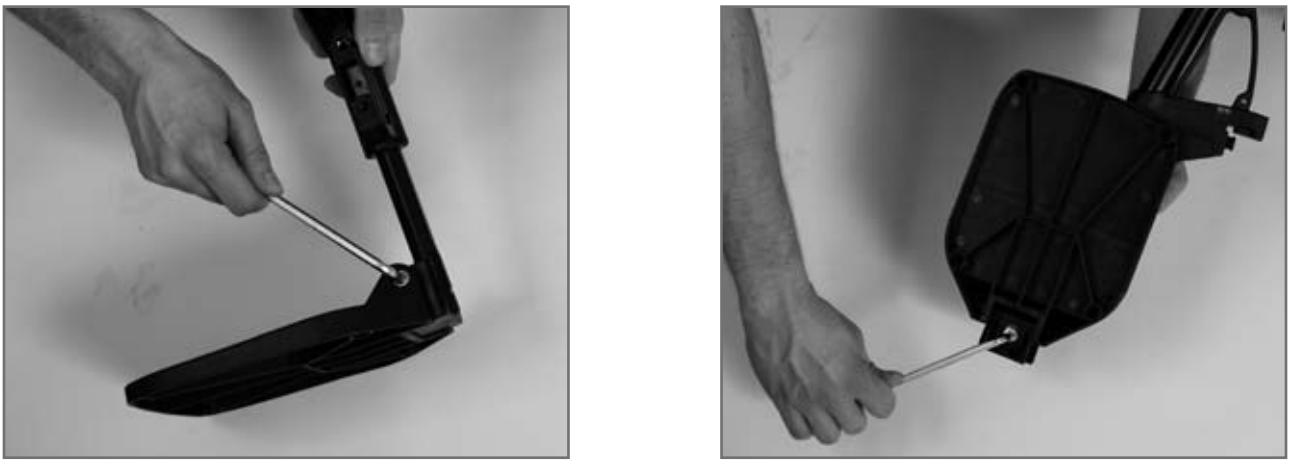


Fig. 18 Replacing the footplate

6.7 Wheels

⚠ CAUTION

Risk of accidents due to worn or defective tyres. Replace wheels with PU tyres if the material is cracking or damaged or when the tread becomes worn down to such an extent that there is only 5 mm of radius left on the outer edges of the tyre.
Replace the casing of pneumatic tyres if it is bald or shows signs of cracking or other damage.

The B400 power wheelchair is propelled by two 14" drive wheels (optional: 12.5"). Two 9" castor wheels are used for steering (optional: 8").

6.7.1 Checking the general condition

INFORMATION

Direct sunlight (UV light) causes the tyres to age prematurely. As a result, the tread surface hardens and corner pieces break out of the tread.

INFORMATION

Avoid parking the wheelchair outdoors whenever possible. The tyres should be replaced every 2 years regardless of wear and tear.
If the wheelchair is parked for an extended period of time or the tyres overheat (e.g. in the vicinity of radiators or in case of exposure to strong sunlight behind glass), the tyres may become permanently deformed. Therefore, sufficient clearance should always be maintained from sources of heat, and the wheelchair should be moved frequently or placed on blocks for storage.

Steps:

1. Verify the tyre condition in regards to tread, porosity and cracking.

6.7.2 Replacing the casing or inner tube for pneumatic tyres

Both the castor and the drive wheels have two-piece rims that can be separated through removing of the Allen head screws.

Tools:

❒ Plastic tyre lever
❒ Inner tube repair kit
❒ Allen wrench, size 6

Steps:

1. Let the air out of the tyre.
2. Loosen all five Allen head screws.
3. Separate the two pieces of the rim.
4. Pry back the casing from the edges of the rim.
5. Push the valve completely through to the inside of the rim and pull out the tube.
6. Repair the tube with a conventional bicycle tube repair kit or replace it.

Properly reassemble all components upon completion of the work.

Fig. 19 Removing the casing

6.7.3 Replacing the drive wheel

> ***NOTICE***
>
> **Risk of damage due to improper preparation for maintenance work.** Use suitable objects such as wooden blocks to secure the B400 power wheelchair against sliding or tipping. The drive wheels must rotate freely.

Steps:

1. Jack up the drive wheels.
2. Loosen all four Allen head screws, remove the wheel and replace it if required.

Properly reassemble all components upon completion of the work.

INFORMATION When reassembling the wheel, tighten all four Allen head screws with a torque of 25 Nm.

Fig. 20 Removing the drive wheel

6.7.4 Replacing/retrofitting with the drive wheel splash guards

NOTICE

Risk of damage due to improper preparation for maintenance work. Use suitable objects such as wooden blocks to secure the B400 power wheelchair against sliding or tipping. The drive wheels must rotate freely.

The splash guard is screwed on above the wheel flange.

Preparation:

❒ Remove the drive wheels (see section 6.7.3).

❒ Remove the motor (only for retrofitting, see section 6.12).

Tools:

❒ Allen wrench, size 4

❒ Ring or open-end spanner, size 10

Steps:

1. Loosen 2 x self-locking nuts on the splash guard.
2. **Only for retrofitting:** Insert the mounting screws into the frame from the inside.
3. Make sure the mounting screws are held in the square holes in the frame.
4. Slide the splash guard over the mounting screws.
5. Attach 2 x washers and tighten the self-locking nuts.

Properly reassemble all components upon completion of the work.

Fig. 21 Loosening the hex nuts on the splash guard

6.7.5 Replacing the castor wheels

NOTICE

Risk of damage due to improper preparation for maintenance work. Use suitable objects such as wooden blocks to secure the B400 power wheelchair against sliding or tipping. The drive wheels must rotate freely.

INFORMATION

When installing the castor wheel, ensure that the castor and drive wheels are aligned.

Tools:

❒ 2 x Allen wrench, size 4

Steps:

1. Remove the Allen head screws on the castor fork.
2. Remove the castor wheel and replace it if required.

Properly reassemble all components upon completion of the work.

INFORMATION Tighten the Allen head screw to **10 Nm**.

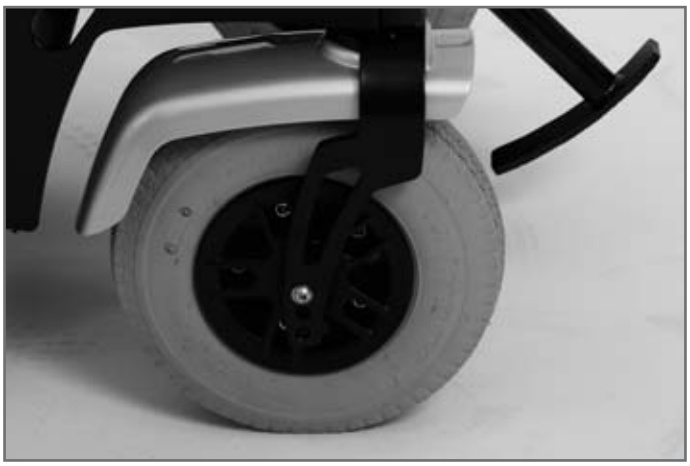


Fig. 22 Castor wheel

6.7.6 Replacing the castor fork

INFORMATION

Do not tighten the fork too snugly; the fork must be able to turn by approximately 180° at a time.

The castor forks for the B400 power wheelchair are supplied as complete units.

Tools:

❒ Socket, size 19

Steps:

1. Remove the black plastic protective cap.
2. Loosen the nut.

3. Remove the castor fork and replace it if required.

Properly reassemble all components upon completion of the work.

Fig. 23 Disassembling the castor fork

6.7.7 Installing the splash guard for the castor fork (option)

INFORMATION

When installing the castor wheel, ensure that the castor and drive wheels are aligned.

The splash guard for the castor wheel is attached to the castor fork.

Preparation:

❒ Remove the castor wheel.

Tools:

❒ Allen wrench, size 3

Steps:

1. Hold the splash guard up against the castor fork so that the mounting holes line up.
2. Insert two Allen head screws through the holes and tighten from the inside.

Fig. 24 Attaching the splash guard for the castor fork

6.8 Control panel/lighting module

6.8.1 Replacing the control panel

Replacing a control panel is necessary both when the control panel is required as a spare part and when additional seat functions or controls for the optional lighting (version A) are required.

Tools:

❒ Allen wrench, size 3

Steps:

1. Loosen the two Allen head screws on the holder.
2. Remove the control panel and replace it with a new one.

Properly reassemble all components upon completion of the work.

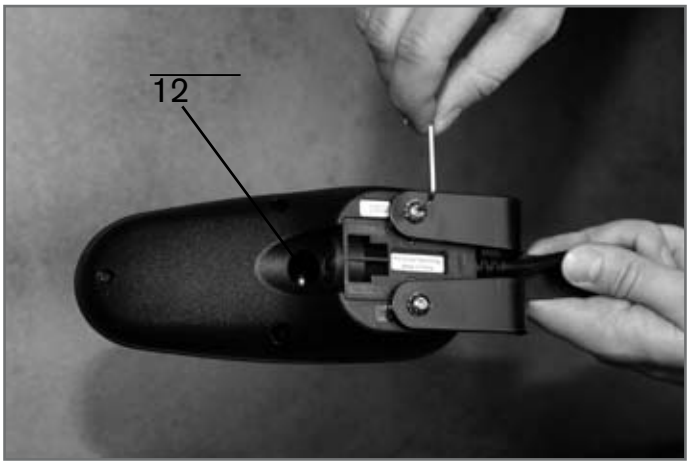


Fig. 25 Replacing the control panel

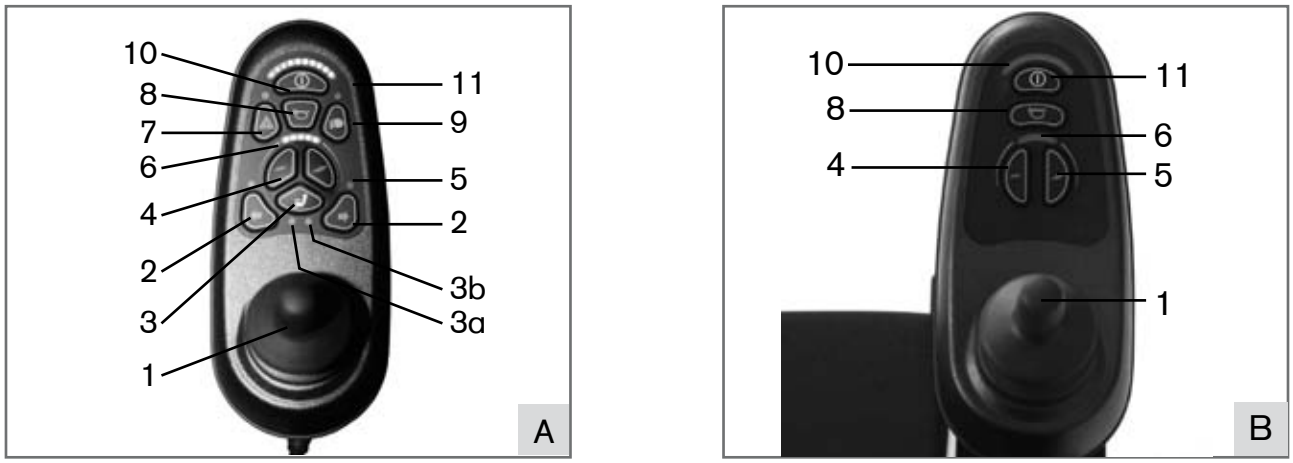


Fig. 26 Control panel VR2 - version A/B

1	Joystick	5	Speed button: fast
2	Direction indicator key: right/left	6	Speed level indicator (LED display)
3	Additional power functions: selection key	7	Warning flasher on/off
3A:	LED for power seat tilt/	8	Horn
	If toggle switch activated: power	9	Lights on/off
	footrests (see section 7.5)	10	On/Off button
3B:	LED for power back angle adjustment	11	LED battery capacity indicator
4	Speed button: slow	12	Bottom (see fig. 25)

The control panel – version A – has supplementary keys for controlling the lighting function:

Key	Function
Light key	Turns the front/rear lights on and off
Warning flasher key	Turns the warning flasher on and off (all four direction indicators flash simultaneously)
Direction indicator right/ left	Turns the direction indicators on and off (indicators automatically stop flashing after 20 seconds)

Table 3 Supplementary function keys on control panel – version A –

6.8.2 Replacing the control panel holder

The control panel holder for the B400 power wheelchair is clamped to the underside of the armrest with a linear guide.

Preparation:

❒ Remove the side panel.

❒ Remove and set aside the control panel.

Tools:

❒ Allen wrench, size 3

Steps:

1. Remove the side panel from the holder.
2. Loosen the two set screws.
3. Change the position of the control panel holder, or remove the control panel holder and replace it if required.

Fig. 27 Replacing the control panel holder

6.8.3 Mounting the lighting module

⚠ CAUTION

Risk of injury as a result of incorrect positioning. The housing of the lighting module can heat up to more than 40°C. The lighting module must therefore be mounted in a place where the wheelchair user will not come in contact with it.

NOTICE

Risk of damage caused by incorrect positioning. The lighting module must be mounted in a place on the wheelchair where it is protected from moisture and dust according to ISO standard 7176/9. Do not install the module in a place where it will be subject to excessive impact or vibration. Direct impact to or jolting of the lighting module must be avoided.

The lighting module in conjunction with the control panel – version A – (see section 6.8.1) provides a means of control for the lighting system (see section 6.9). It has three connection sockets (see table 4 and fig. 29).

The lighting module is pre-programmed. It can be adapted to the respective lights (see section 8.4) by programming with the hand-held programming device (see section 8.3).

Connector sockets	Function
Connector socket 1	3-pin plug for control of the lamps on the left side
Connector socket 2	3-pin plug for control of the lamps on the right side
Connector socket 3	Socket for connection to the power module/control panel

Table 4 Connector sockets on the lighting module

Preparation:

❒ Mount the control panel – version A – .

❒ Lay out the supplied cables and plugs.

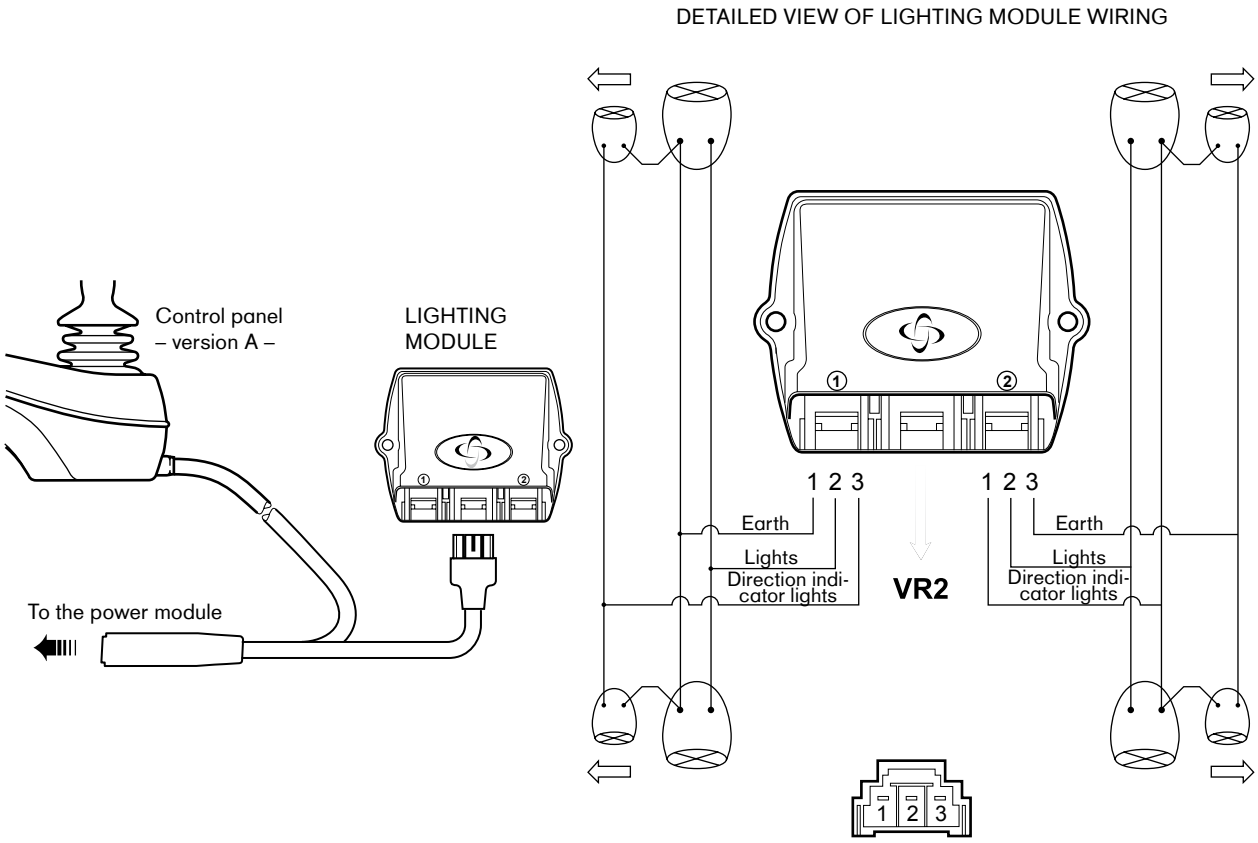
Tools:

❒ Phillips screwdriver

Steps:

1. Remove the cover of the controller.
2. Attach the lighting module in vertical position beside the controller by screwing M4 screws into the pre-drilled holes (see fig. 29; connector sockets must face down).
3. Plug the connection cable firmly into the middle connector socket and connect the lighting module to the power module/control panel (see fig. 29).
4. The lighting module is ready to be retrofit with lights.

Fig. 28 Mounting the lighting module



Connection	Function
Pin 1	Earth
Pin 2	Lights
Pin 3	Direction indicator lights

Fig. 29 Connecting the lighting module to the control panel/power module, wiring of the lighting module

6.9 Lighting

6.9.1 Retrofitting with lighting

The optionally available lighting for the B400 power wheelchair can be retrofitted at any time.

a) Front lights

The front lights are attached to the side panel.

Preparation:

❒ Mount control panel – version A – and lighting module (see section 6.8.1/6.8.3).

❒ Remove the side panel.

Tools:

❒ Allen wrench, size 3

Steps:

1. Unscrew the plastic adapter on the side panel.
2. Insert the light holders into the outer slots and screw in (see fig. 30).
3. Guide the lighting cable around the seat frame and secure with cable ties.
4. Connect the lighting cable to the controller below the seat at the designated input.

Properly reassemble all components upon completion of the work.

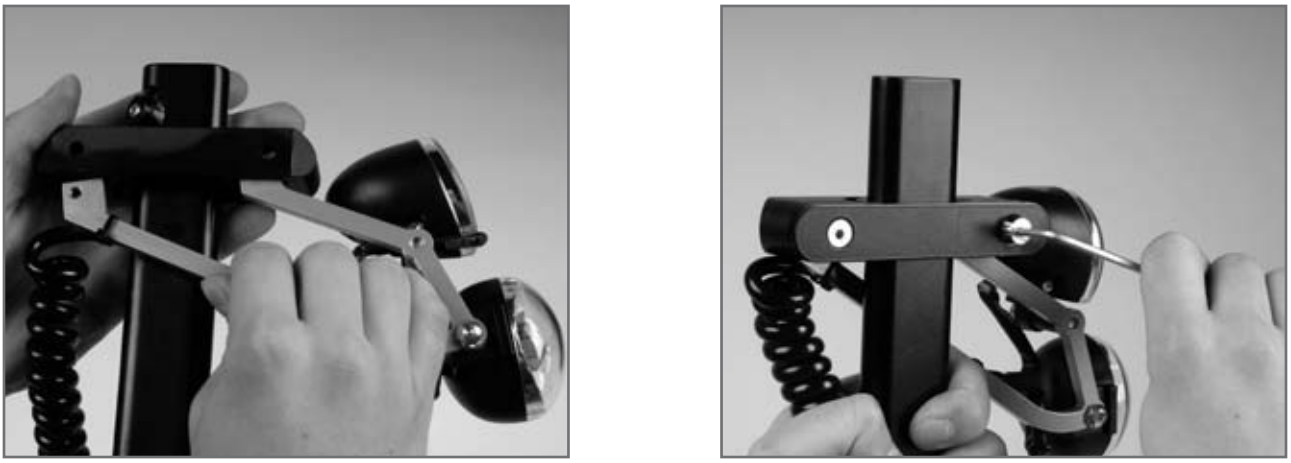


Fig. 30 Retrofitting with front lights

b) Rear lights

The rear lights are attached to the back of the drive unit bracket with two holders.

Tools:

❒ Allen wrench, size 5

Steps:

1. Insert pan head screws through the drive unit bracket from the inside.
2. Secure the pan head screws with two lock nuts.

Fig. 31 Retrofitting with rear lights

6.9.2 Replacing defective lamps

Tools:

❒ Allen wrench, size 3

❒ Flat screwdriver, narrow

a) Front lights

Steps:

1. Loosen the Allen head screw.
2. Take the front LED light out of the holder as a complete part.
3. Disconnect the cable from the front LED light.
4. Replacing the front LED light

Properly reassemble all components upon completion of the work.

Fig. 32 Replacing the front lighting

b) Front direction indicator light

Steps:

1. Press slightly down on the notch at the top of the housing until the lug disengages.
2. Fold down the cover.
3. Turn the lamp anticlockwise a quarter turn and remove.

Properly reassemble all components upon completion of the work.

INFORMATION When carrying out the installation make sure the lug on the lamp engages in the notch on the socket.

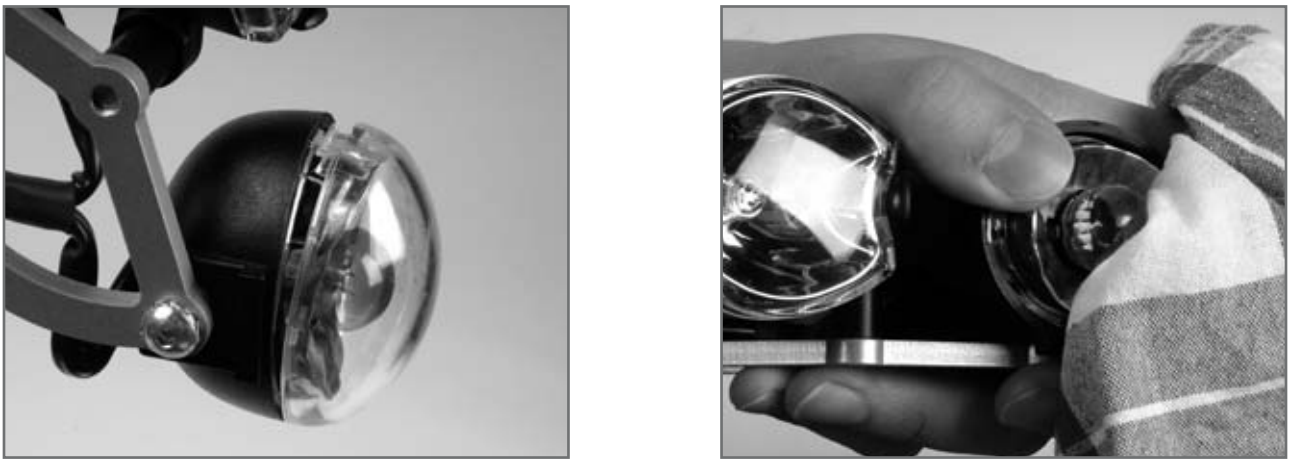


Fig. 33 Replacing the front direction indicator

c) Rear direction indicator

Steps:

1. Loosen two Phillips head screws and remove the glass cover.
2. Pull the lamp forward out of the socket and replace it.

Properly reassemble all components upon completion of the work.

d) Tail light

Steps:

1. Loosen two Phillips head screws and remove the glass cover.
2. Pull the lamp downward out of the socket and replace it.

Properly reassemble all components upon completion of the work.

INFORMATION When carrying out the installation make sure the lug on the lamp engages in the notch on the socket.

INFORMATION Ensure the glass covers are seated properly in the housing when installing them. Tighten the screws on the glass cover firmly so that moisture cannot penetrate into the lamp.

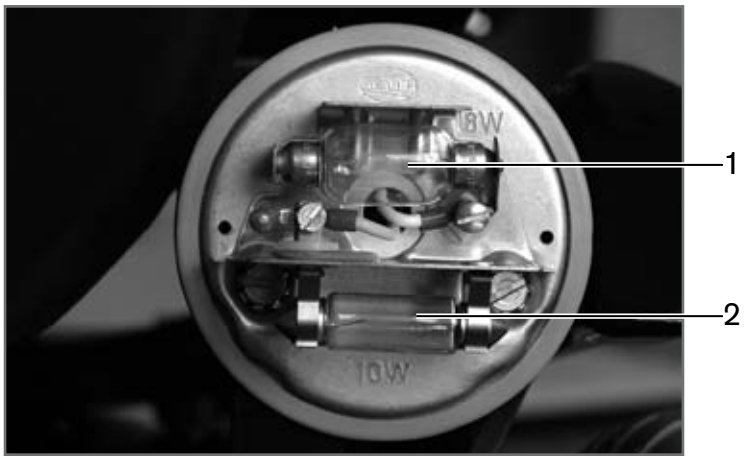


Fig. 34 Replacing the lamps on the direction indicator light and the tail light

1 Direction indicator lamp
2 Tail light lamp

6.10 Seats

⚠ CAUTION

Risk of burns in the proximity of fire. The backrest and seat surface of the B400 power wheelchair are flame retardant but nevertheless flammable. Therefore utmost caution is required near any sources of open flames or sparks, especially lit cigarettes.

NOTICE

Risk of damage to the seat upholstery. When work is being carried out on the seat, the padding must be adequately protected against mechanical and chemical damage.

6.10.1 Replacing the bearing plate

Tools:

❒ Allen wrench, size 5

❒ Ring or open-end spanner, size 13

Steps:

1. Loosen the three Allen head screws marked with arrows (see fig. 35).
2. Remove the bearing plate and replace it if required.

INFORMATION The fourth screw in the centre of the plate serves as a stop for the back angle adjustment feature.

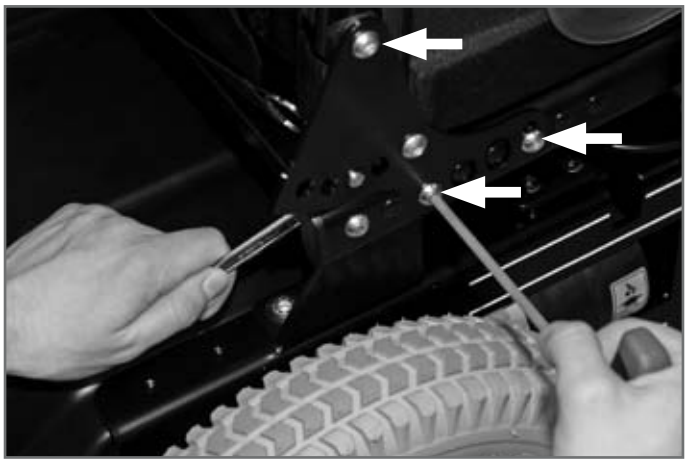


Fig. 35 Replacing the bearing plate

6.10.2 Standard seat: Replacing/adjusting the back upholstery

Steps:

1. Completely remove the back upholstery and readjust, remove or replace the hook-and-loop straps according to individual user requirements.

Fig. 36 Standard seat: back upholstery

6.10.3 Standard seat: Replacing the seat frame

NOTICE

Risk of cable damage. Take note of the cables attached to the seat frame with cable ties. Carefully cut the cable ties with side-cutting pliers or a knife. Ensure that you do not damage the cables in the process!

Preparation:

❒ Remove the side panels.

Tools:

❒ Allen wrench, size 5

❒ Ring or open-end spanner, size 13

Steps:

1. Loosen all cables connected to the seat frame by cable ties.
2. Loosen the two Allen head screws on the front seat brackets.
3. Loosen the two Allen head screws on the rear seat brackets.
4. Remove the seat frame and replace it if required.

Properly reassemble all components upon completion of the work.

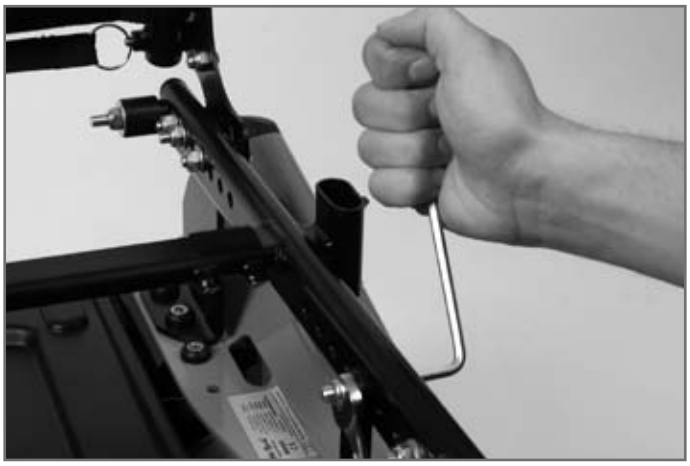


Fig. 37 Standard seat: replacing the seat frame

6.10.4 Standard seat: Replacing the seat plate

Only standard seats have seat plates.

Steps:

1. Remove the seat cushion.
2. Pull the seat plate up with a sharp tug and replace it if required.

Properly reassemble all components upon completion of the work.

Fig. 38 Standard seat: replacing the seat plate

6.10.5 Standard seat: Changing the seat height

NOTICE

Risk of cable damage. Make sure the cables attached to the frame with cable ties do not become damaged.

Changing the seat height of the B400 power wheelchair requires replacement of the seat brackets. The seat brackets are screwed directly to the frame at the front.

Preparation:

❒ Remove the seat.

Tools:

❒ Allen wrench, size 5

❒ Ring or open-end spanner, size 13

Steps:

1. Remove the black plastic caps on the rear Allen head screws.
2. Loosen the Allen head screws on the rear seat brackets.
3. Loosen the Allen head screws on the two front seat brackets (see fig. 39).
4. Remove the seat brackets from the seat frame and replace if required.

Properly reassemble all components upon completion of the work.

Fig. 39 Front seat brackets

6.10.6 Standard seat: Adjusting the seat inclination

(without mechanical seat tilt)

The two front seat brackets are used to adjust the seat inclination. There are several bore holes situated at the lower ends of the brackets. Switching to a different hole changes the seat inclination: e.g. top 0°/middle 3°/bottom 6°.

Tools:

❒ Allen wrench, size 5

❒ Ring or open-end spanner, size 13

Steps:

1. Loosen the lower screw connections of the front seat brackets (see fig. 40).
2. Push the seating unit up or down until the desired seat inclination is achieved.
3. Fasten the screws on the seat brackets.

Properly reassemble all components upon completion of the work.

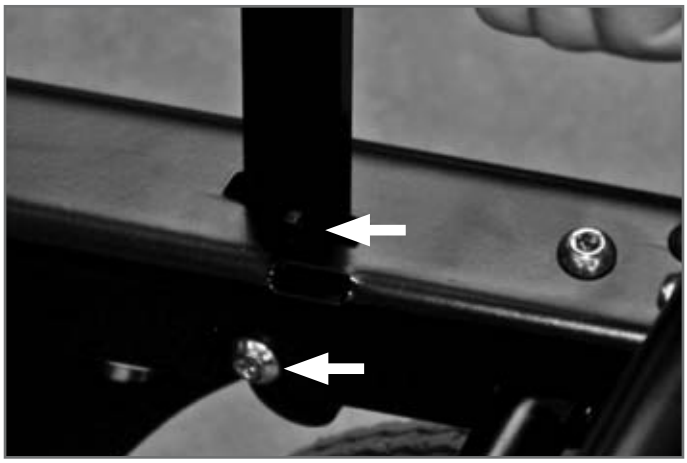


Fig. 40 Adjusting the seat inclination

6.10.7 Standard seat: Replacing/adjusting the side panel bracket

The attachment is located on either side on the rear cross brace under the seat.

Tools:

❒ Allen wrench, size 3

Steps:

1. Loosen the two set screws.
2. Remove the side panel bracket and replace or readjust as required (see fig. 41, item 1).

Properly reassemble all components upon completion of the work.

Fig. 41 Side panel bracket

1 Side panel bracket

6.10.8 Standard seat: Replacing the backrest

The backrest is screwed to the bearing plate.

Tools:

❒ Allen wrench, size 6

❒ Ring or open-end spanner, size 13

Steps:

1. Remove the backrest from the bearing plate.
2. Mount the backrest to the bearing plate. Ensure the spacers and washers are installed in the correct order (see fig. 42, right).

Fig. 42 Mounting the backrest

6.10.9 Installing the Contour seat (option)

The optional Contour seat is attached to the seat plate with hook-and-loop straps. You can mount the Contour seat on the frame of the standard seat.

Tools:

❒ Allen wrench, size 3

Steps:

1. Set the seat surface with the hook-and-look straps on to the seat plate and press it into place.
2. Remove the back upholstery.
3. Slip three mounting clamps for the back of the Contour seat on to each of the right and left sides of the frame.
4. Put the seat back in place and mount it with six Allen head screws.

Fig. 43 Contour seat backrest with clamps

6.11 Replacing the drive unit bracket

⚠ CAUTION

Risk of injury due to electric current. Turn off the B400 power wheelchair prior to performing any work on the drive unit brackets and disconnect all plug connections between the drive unit bracket and the frame. Before removing the motors disconnect the brake release wires.

⚠ CAUTION

Risk of injury through lifting tasks. Some components, e.g. the batteries, frame, seat and motors, are very heavy. When removing or installing such components, ensure they are lifted in an ergonomically correct manner. Only use hoisting devices of sufficient capacity.

INFORMATION

Suspension, floating discs and rocker arm (see section 6.13) can only be mounted on the drive brackets if 50 Ah (C5) AGM batteries are used. These items must be ordered separately.

Tools:

❒ Allen wrench, size 5

❒ Allen wrench, size 6

Steps:

1. Remove the seat including seat frame.
2. Remove the lights.
3. Remove all components attached to the frame and drive unit bracket:
   - Battery cover (see section 6.3.4)
   - Controller (see section 6.4)
   - Side panels (see section 6.5)
   - Footrests (see section 6.6)
   - Wheels (see section 6.7)
   - Motors (see section 6.12)
   - Suspension/floating discs/rocker arm (see section 6.13)

Properly reassemble all components upon completion of the work.

INFORMATION Static electricity caused by factors such as friction may lead to electrostatic discharge (high voltage with low current) upon contact with the wheelchair; however, this does not represent a health hazard. Since this may impair comfort, it can be prevented through mounting of an earthing strip on the drive unit bracket/wheelchair frame.

6.12 Replacing the drive motor

⚠ CAUTION

Risk of injury due to electric current. Turn off the control unit of the B400 power wheelchair and disconnect all plug connections to the control unit/power module before performing any work on the drive motors.

Preparation:

❒ Detach the drive wheel (see section 6.7.3).

❒ Remove the batteries (see section 6.3.2).

❒ Remove the fuse (see section 6.2).

Tools:

❒ Open-end spanner, size 13 mm

Steps:

1. Disconnect the motor connection on the controller (see fig. 7).
2. Detach the motor:
   a. **Version with suspension:** remove the four socket head cap screws between the rocker arm and the motor (see fig. 44).
   b. **Version without suspension:** remove the four self-locking nuts (not illustrated).
3. Remove the motor and replace it.

Properly reassemble all components upon completion of the work.

Fig. 44 Replacing the drive motor

6.13 Suspension/floating discs/rocker arm

INFORMATION

Suspension, floating discs and rocker arm can only be mounted if 50 Ah (C5) AGM batteries are used.

6.13.1 Replacing the spring element

Preparation:

❒ Remove the drive wheel (see section 6.7.3).

❒ Remove the battery (see section 6.3.2).

Tools:

❒ Ring or open-end spanner, size 13

❒ Allen wrench, size 6

Steps:

1. Loosen the screws on the top and bottom of the spring element.
2. Unscrew the Allen head screws.
3. Remove and replace the spring element with the mounting accessories.
4. Mount the top and bottom spring elements with the mounting accessories again. Ensure the small parts are mounted in the correct order (see fig.45, right).

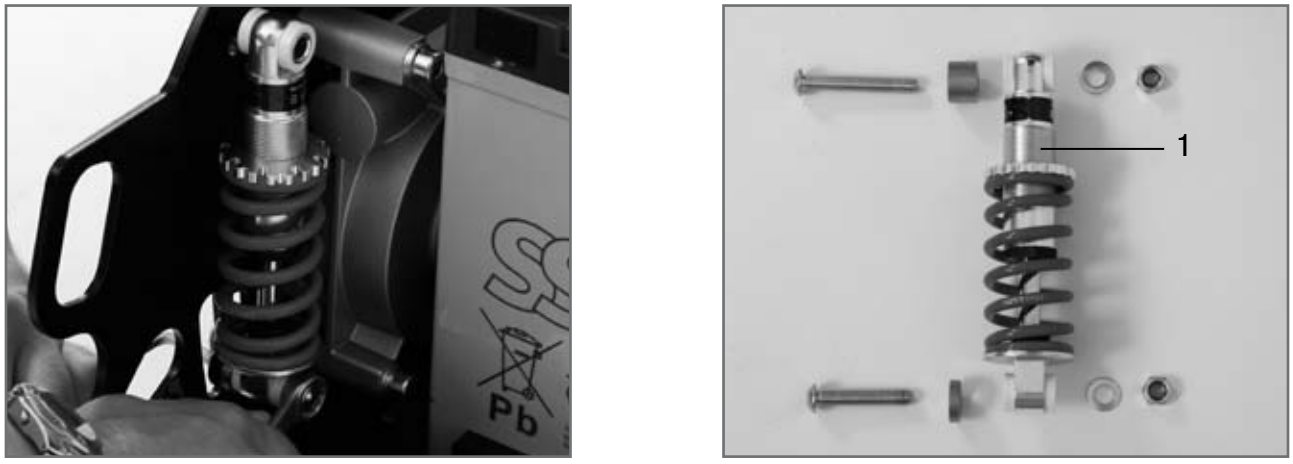


Fig. 45 Replacing the spring element

6.13.2 Adjusting the spring element

Preparation:

❒ Remove the battery cover (see fig. 5).

Steps:

1. Twist the adjustment ring on the spring element (see fig. 45, item 1):
    a. Twist the adjustment ring to the right: the spring travel is shortened.
    b. Twist the adjustment ring to the left: the spring travel is lengthened.

6.13.3 Replacing the floating discs on the rocker arm

INFORMATION

The floating discs should be replaced on both sides.
Three floating discs with collars and three floating discs without collars are used per rocker arm.
The floating discs without collars can be removed through removal of the Allen head screws (see fig. 46).
The floating discs with collars are inserted from the inside into the drill holes on the rocker arm (not illustrated). To replace these floating discs it is necessary to detach the rocker arm.

The floating discs between the drive bracket and the rocker arm should be 3 mm wide. If they have been worn down to less than **1.5–2 mm** in width, they must be replaced immediately.

Preparation:

❒ Remove the drive wheel (see section 6.7.3).

❒ Remove the battery (see section 6.3.2).

❒ Remove the spring element (see section 6.13.1).

Tools:

❒ Ring or open-end spanner, size 13

❒ Allen wrench, size 6

Steps:

1. Loosen the screws on the rocker arm (see figs. 46 and 47).
2. Unscrew the Allen head screws from the outside.
3. Remove the floating discs without collars and the washers and replace them.
4. Detach the rocker arm (see section 6.13.4).
5. Remove the floating discs with collars from the drill holes in the rocker arm and replace them.
6. Install the floating discs and washers again in the correct order. When mounting the floating discs on the Allen head screws make sure the floating disc collars are in the rocker arm holes.
7. Tighten the self-locking nuts. Twist the upper mounting screws the other way. Make sure the Allen head screws can be moved in the respective oval holes without resistance.
8. Check the spring travel: remove the spring elements (see section 6.13.1). Depress and release the wheel suspension. The wheel suspension must be able to be moved slightly. If necessary readjust the self-locking nuts. Reinstall the spring elements.

Properly reassemble all components upon completion of the work.

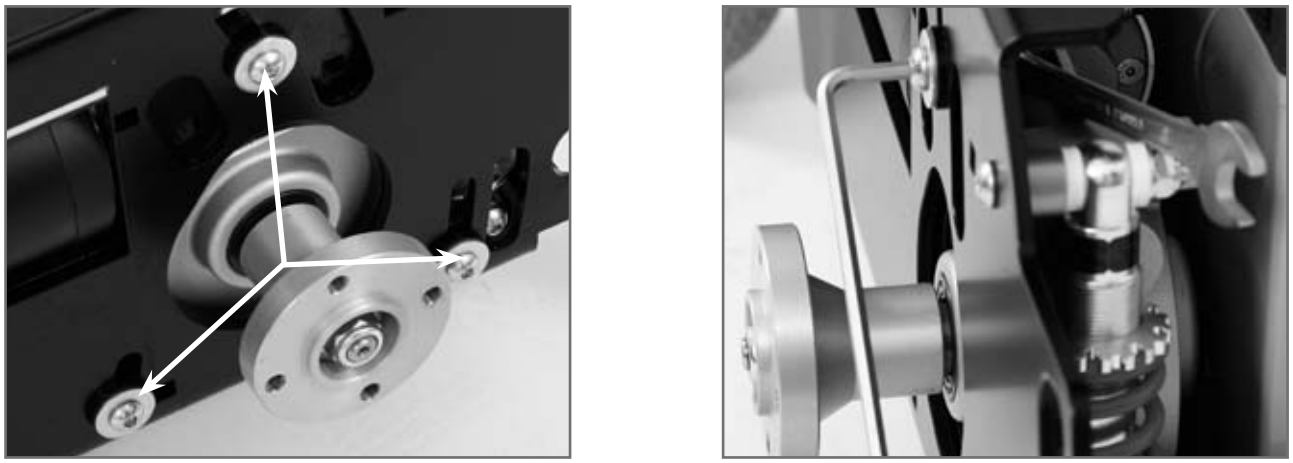


Fig. 46 Floating discs, disassembly

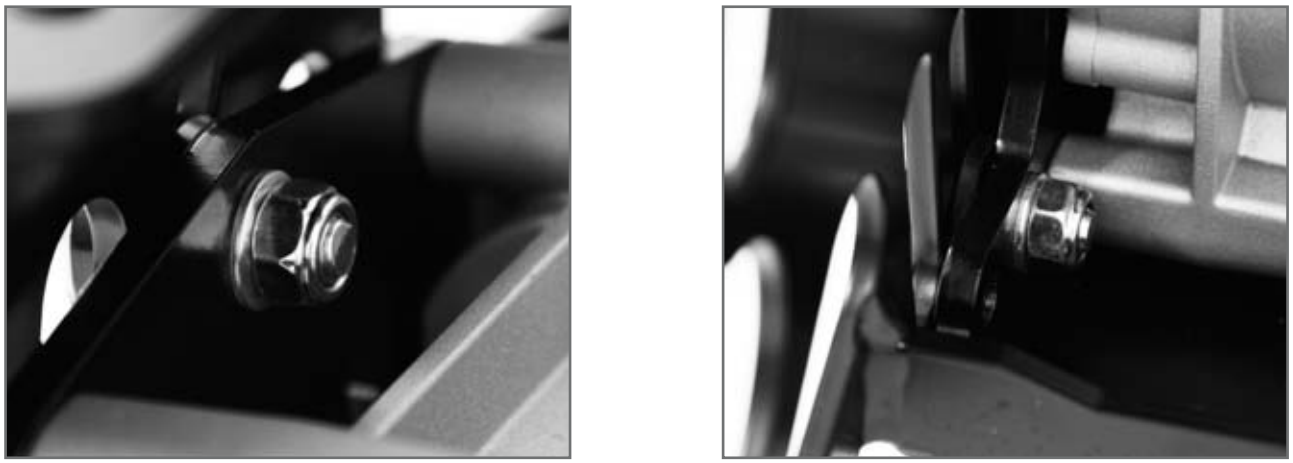


Fig. 47 Fastening the floating discs (top/bottom)

6.13.4 Replacing the rocker arm

Tools:

- ❒ Ring or open-end spanner, size 13
- ❒ Allen wrench, size 6
- ❒ Flat screwdriver

Steps:

1. Remove all parts fastened to the rocker arm:

a. Battery (see section 6.3.2)

b. Drive wheel (see section 6.7.3)

c. Drive motor (see section 6.12)

d. Spring element (see section 6.13.1)

e. Floating discs (see section 6.13.3)

2. Remove and replace the rocker arm. Secure the screw in the rotary joint against rotating using the flat screwdriver (see fig. 48, arrow) and loosen the hex nut in the battery compartment.

Properly reassemble all components upon completion of the work. Make sure the large steel disc is positioned between the rocker arm and the driver bracket.

Fig. 48 Rocker arm pivot

6.14 Brakes and brake release

The brake release units are located on the left and right sides of the motors. They are functional components of the drive motors and cannot be repaired separately.

Should no braking effect be available, the motor must be replaced (see section 6.12).

6.15 Accessories

6.15.1 Retrofitting with mechanical seat tilt

Preparation:

❒ Remove the seat plate.

Tools:

❒ Allen wrench, sizes 2, 4, 5

❒ Ring or open-end spanner, sizes 10, 13

Steps:

1. Remove the plug from the frame.
2. Insert the lower receiver for the gas spring into the frame: on the left side into the frame cut-out (fig. 49-1)/on the right side into the semi-oval frame hole (fig. 49-2).
3. Insert the Allen head screw from above. Slide on the supplied distance bushings from below and secure with nuts (fig. 49-3).

INFORMATION Distance bushings must be used to prevent the frame warping.

4. Insert an Allen head screw at the third attachment point of the lower gas spring receiver into the existing bore hole beneath the drive unit bracket and tighten (fig. 49-4).
5. Remove the front seat bracket.
6. Mount the cross-brace for the upper gas spring receiver (fig. 49-5).

7. Move the upper end of the gas spring between the two lugs of the cross-brace. Mount the threaded sleeve. Insert a spacer between the lug and the spring on either side (fig. 49-6).
8. Mount the lower end of the gas spring with the gas spring receiver with threaded sleeve as described in 7.
9. Mount the Bowden cable on the side opposite to the control panel side (see section 6.15.2).

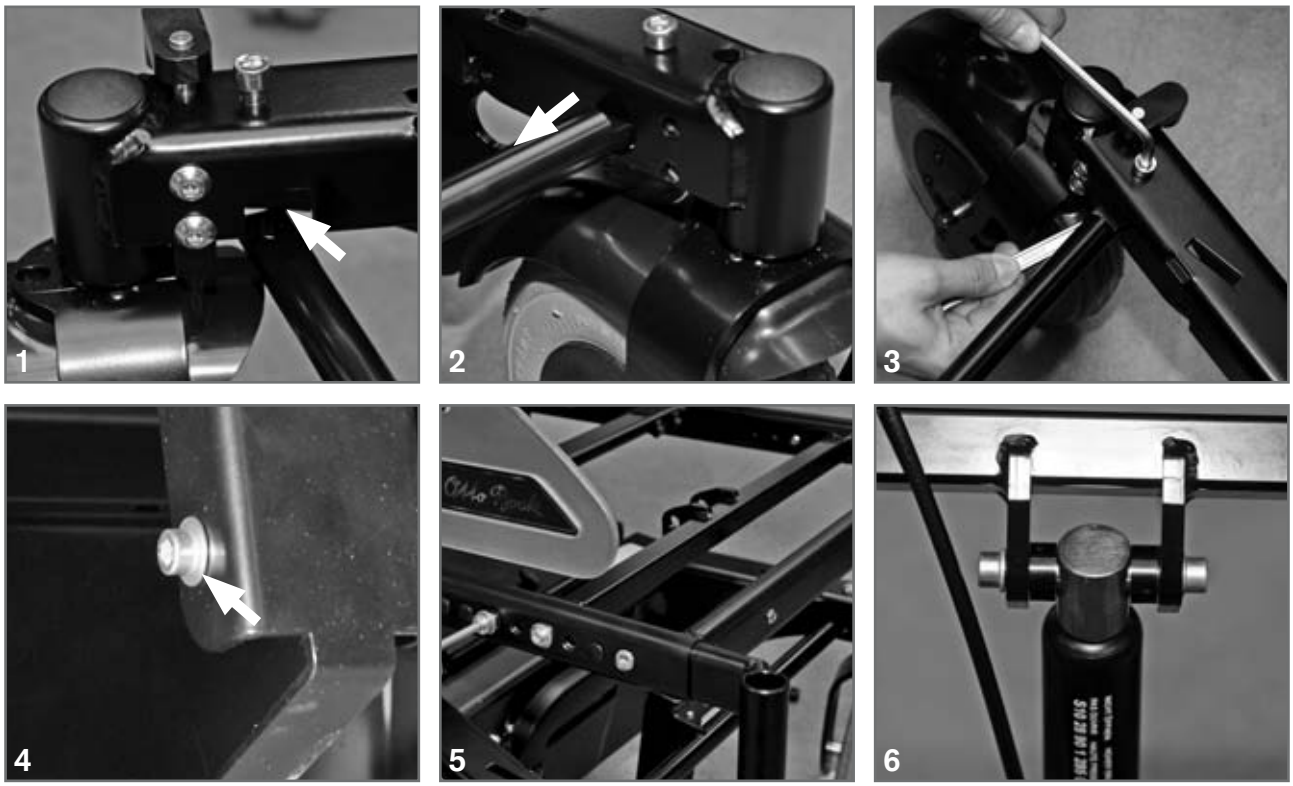


Fig. 49 Retrofitting with mechanical seat tilt

6.15.2 Attaching the Bowden cable for seat tilt

Preparation:

❒ Mount the gas spring.

❒ Remove the side panel.

Tools:

❒ Allen wrench, sizes 2, 5

Steps:

1. Mount the C-profile for the Bowden cable attachment beneath the armrest.
2. Mount the clamp piece and sliding nut.
3. Position the release lever with the sliding nut and tighten the Allen head screw.

Mount the side panel, making sure to position the Bowden cable correctly.

Fig. 50 Fastening the Bowden cable

6.15.3 Retrofitting with mechanical back angle adjustment

A frame with mounting struts, which is included in the replacement kit, is required for the backrest in order to mount the mechanical back angle adjustment option.

Tools:

❒ Allen wrench, size 3

❒ Two Allen wrenches, size 4

Steps:

1. Remove the bearing plates.
2. Mount the frame with mounting strut.
3. Insert the upper end of the gas spring between the two lugs in the centre of the backrest.
4. Place spacer sleeves on the brass sleeve to the left and right of the gas spring.
5. Attach the gas spring using the brass bushings and two Allen head screws.
6. Hook the lower end of the gas spring into the Bowden cable.
7. Slide the bolt through the end of the gas spring and secure with a retaining ring.
8. Hook the bolt at the bottom of the cross tube on the back into the adapter.
9. Install the Bowden cable and mount it to the armrest on the left or right.

Fig. 51 Retrofitting with mechanical back angle adjustment

6.15.4 Retrofitting with kerb climber

Tools:

❒ Allen wrench, size 6

❒ Open-end spanner, size 13 mm

Steps:

1. Insert the kerb climber into the frame: on the left side into the frame cut-out (fig. 52-1)/on the right side into the semi-oval frame hole (fig. 52-2).
2. Slide on the supplied distance bushings from below. The distance bushings are between the frame and the kerb climber and serve to maintain clearance to avoid warping.
3. Insert the Allen head screw from above and secure from below with a hex nut (fig. 52-3).

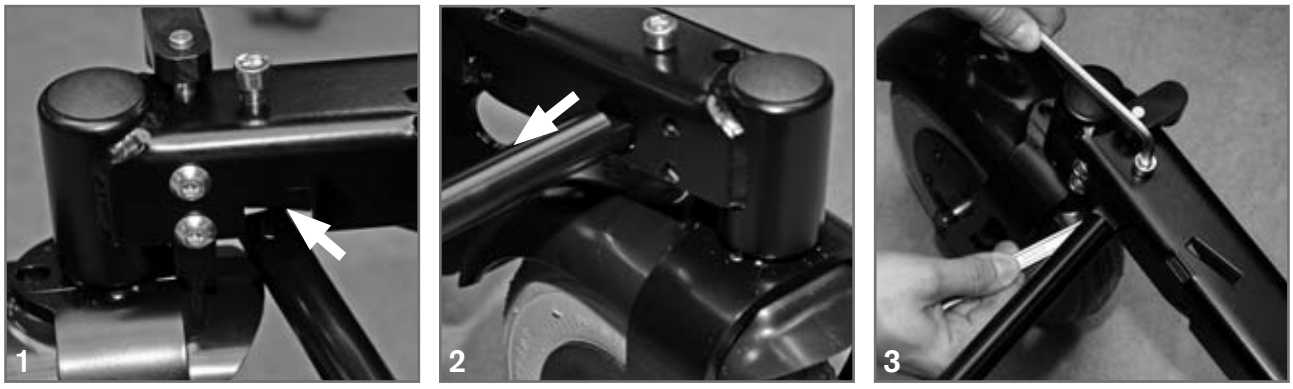


Fig. 52 Mounting the kerb climber

6.15.5 Retrofitting with rearview mirror

Tools:

❒ Allen wrench, size 3

Steps:

1. Mount the rearview mirror to the C-profile of the armrest. Mounting on both sides is possible.
2. Individually adjust it to user requirements by turning it manually.

Fig. 53 Retrofitting with rearview mirror

6.15.6 Installing castor swivel lock (option)

INFORMATION

The swivel locks prevent the castors from turning. In addition, they counteract possible fluttering when driving straight forward for a longer time.

Preparation:

❒ Remove the castor fork.

Tools:

❒ Allen wrench, size 5

Steps:

1. Remove the cover caps from the front frame.
2. Put together the spring and axle of the castor swivel lock kit (fig. 54-1).
3. Insert the axle and spring of the castor swivel lock from beneath through the receiving hole in the frame and affix with Allen head screws (fig. 54-2).
4. Secure the plastic locking lever with lock washers (above/below) (fig. 54-3A).
5. Screw the locking screws into the frame (fig. 54-3B).

Properly reassemble all components upon completion of the work.

Fig. 54 Mounting the castor swivel lock

6.15.7 Installing the bracket for headrest mounting (option)

The headrest bracket is attached to the back frame.

Tools:

❒ Allen wrench, size 3

❒ Ring or open-end spanner, size 10

Steps:

1. Attach the bracket to the top of the back tube with two screws.

A round back tube requires an adapter plate in order to compensate for the curvature (can be ordered separately). The holes are predrilled.

Fig. 55 Installing a bracket for headrest mounting

6.15.8 Retrofitting with a lap belt (option)

The lap belt is available for both seat models and is attached to the bearing plates, but not also to the back of the seat frame.

The belt is attached and screwed to the bearing plate with a bracket with an eyelet.

Fig. 56 Retrofitting with a lap belt

6.15.9 Installing a luggage carrier (option)

Preparation:

❒ First detach the rear lights if applicable.

Tools:

❒ Allen wrench, size 6

Steps:

1. Mount the luggage carrier to the prefabricated bore holes in the rear frame (see fig. 57).

Fig. 57 Mounting a luggage carrier

6.15.10 Retrofitting with a crutch holder

The crutch holder is screwed on to the side panel.

Preparation:

❒ Remove the side panel.

Tools:

❒ Allen wrench, size 3

❒ Ring or open-end spanner, size 8

❒ Flat screwdriver

Steps:

1. Unscrew the clothing protector. Hold the nuts laterally using a flat screwdriver in the process.
2. Use the longer screws supplied to remount the clothing protector.
3. Use the dome nuts/washers supplied to mount the crutch holder.

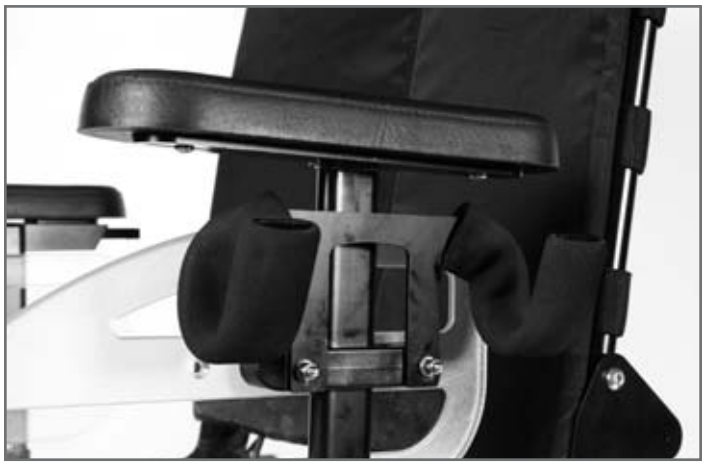


Fig. 58 Crutch holder

6.15.11 Retrofitting with a bag

The bag is screwed on to the side panel.

Preparation:

❒ Remove the side panel.

Tools:

❒ Allen wrench, size 3

❒ Ring or open-end spanner, size 8

❒ Flat screwdriver

Steps:

1. Unscrew the clothing protector. Hold the nuts laterally using a flat screwdriver in the process.
2. Use the longer screws supplied to remount the clothing protector.
3. Mount the supporting plate using the supplied dome nuts/washers (fig. 59-1).
4. Mount the bracket on the supporting plate (fig. 59-2).
5. Hook on the bag (fig. 59-3).

Fig. 59 Mounting a bag

6.16 Power seat functions

INFORMATION

To control all the additional power functions, the controller and the control panel installed must be of the version designed for additional power functions. Please see sections 6.4 and 6.8.

6.16.1 Retrofitting with power back angle adjustment (optional)

For installation of the power back angle adjustment feature a back frame with cross-brace, new upholstery and an actuator for the backrest are required.

The power back angle adjustment is supplied as a preassembled unit.

Preparation:

❒ Turn the control unit off.

❒ Remove the fuse (see section 6.2).

❒ Remove the backrest from the bearing plates (see section 6.10.8).

❒ Remove the bearing plates.

Tools:

❒ Allen wrench, size 5

❒ Ring or open-end spanner, size 13

Steps:

1. Install the bearing plate with cross-brace mounting unit (fig. 60-1).
2. Attach the backrest to the bearing plates.
3. Connect the top and bottom actuators to the backrest:
   a. Top: connect the actuator to the back frame. Ensure the washers are installed in the correct order (fig. 60-2).
   b. Bottom: connect the actuator ratchet bolt to the locking mechanism on the cross-brace (fig. 60-3).
4. If required, replace the controller/control panel with the version designed for additional power functions (see section 6.4/6.8).
5. Connect the actuator to the controller (input A1 or A2; see fig. 69).
6. Check the functioning of the back angle adjustment feature.

Properly reassemble all components upon completion of the work.

NOTICE

Risk of damage to cables due to protrusion into the adjustment area. Fasten the connection cables to the frame with cable ties to prevent them from extending into the adjustment area.

Fig. 60 Retrofitting with power back angle adjustment

6.16.2 Retrofitting with power seat tilt (optional)

The B400 power wheelchair can be retrofitted with two seat tilt versions.

a) Seat tilt to 45°

The seat tilt option is delivered as a preassembled unit (fig. 61-1).

Preparation:

- ❒ Turn the control unit off.
- ❒ Remove the fuse (see section 6.2).
- ❒ Remove the footrest (see section 6.6.1).
- ❒ Remove the seat frame (see section 6.10.3).
- ❒ Remove the backrest (see section 6.10.8).
- ❒ Remove the seat brackets.

Tools:

- ❒ Allen wrench, size 5/6
- ❒ Ring or open-end spanner, size 13

Steps:

1. Mount the front seat brackets (fig. 61-2).
2. Mount the rear seat brackets using the distance bushings (fig. 61-3).
3. Mount the bearing plate to the tilt frame to accommodate the patient's seat depth (fig. 61-4).
4. Mount the preassembled tilt frame to the wheelchair frame. Note the centre of gravity: the pivot of the back adjustment must be located in front of the drive axle (fig. 61-4, see dashed line).
5. If required, replace the controller/control panel with the version designed for additional power functions (see section 6.4/6.8).
6. Connect the speed-reducing switch to the controller (input INH-2; see fig. 67).
7. Connect the actuator to the controller with the help of the adapter cable (input A1 or A2; see fig. 67).
8. Mount the backrest on the bearing plate (see section 6.10.8).
9. Mount the large anti-tipper wheels to the anti-tipper on the left and the right (fig. 61-5).

10. Check the functioning of the seat tilt (fig. 61-6).

Properly reassemble all components upon completion of the work.

NOTICE

Risk of damage to cables due to protrusion into the adjustment area. Fasten the connection cables to the frame with cable ties to prevent them from extending into the adjustment area.

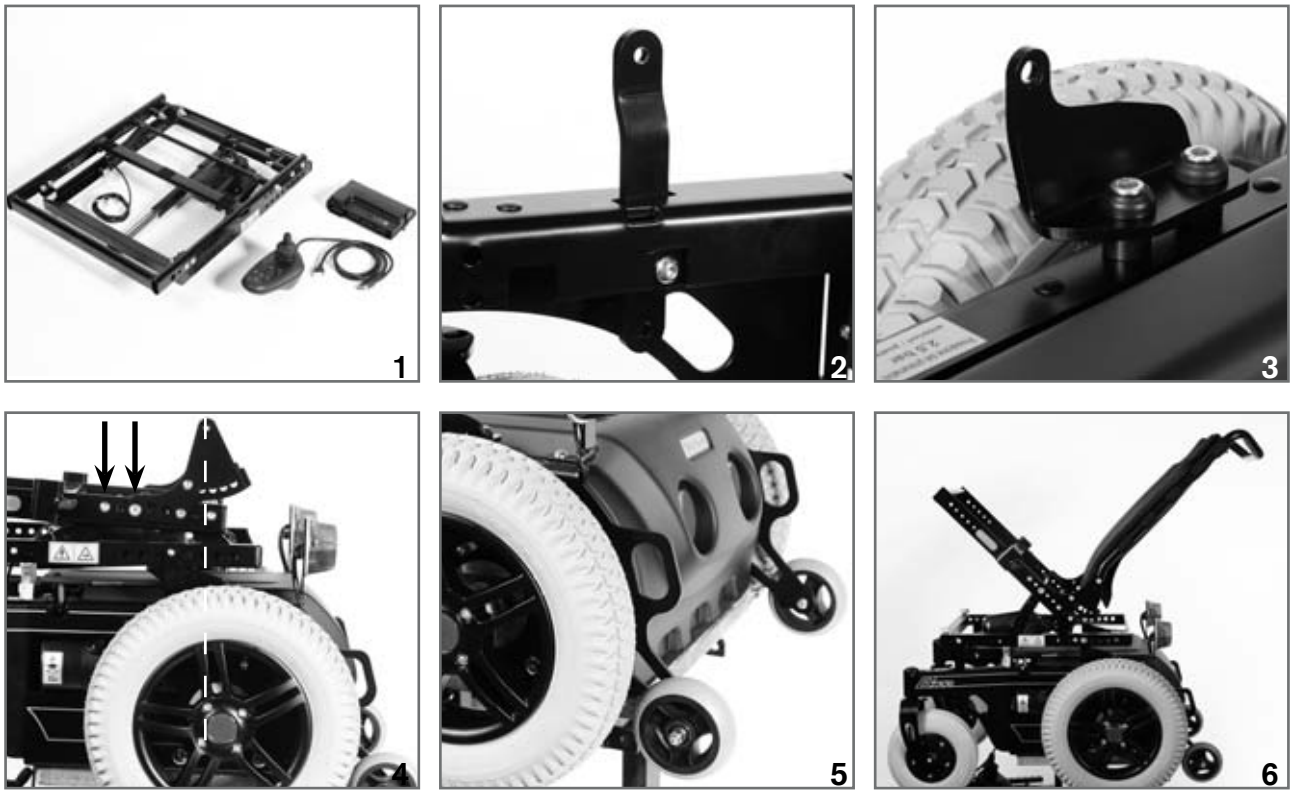


Fig. 61 Retrofitting with 45° seat tilt

b) Seat tilt up to 20°

The seat tilt is mounted in the seat frame of the standard seat (fig. 62-1).

Preparation:

❒ Turn the control unit off.

❒ Remove the fuse (see section 6.2).

❒ Remove the footrest (see section 6.6.1).

Tools:

❒ Allen wrench, size 4/5

❒ Ring or open-end spanner, size 13

Steps:

1. Remove the front seat brackets (fig. 62-1, item A).
2. Mount the axle with stop to the main frame (fig. 62-1, item B).

3. Fasten the mounting sheet to the stop (fig. 62-2, item A).
4. Use a spacer screw/two bushings to secure the stop (fig. 62-2, item B).
5. Fasten the mounting sheet to the frame from below (fig. 62-3, item A).
6. Mount the actuator motor to the mounting sheet (fig. 62-3, item B). Thereby ensure that the spacers/washers are installed in the correct order (see identical mounting configuration in fig. 62-4).
7. Fasten the support bar to the top of the actuator (fig. 62-4).
8. Fasten the support bar to the seat frame. Note correct positioning: the actuator should be as vertical as possible (fig. 62-5).
9. If required, replace the controller/control panel with the version designed for additional power functions (see section 6.4/6.8).
10. Connect the actuator to the controller with the help of the adapter cable (input A1 or A2; see fig. 67).
11. Check the functioning of the seat tilt.

Properly reassemble all components upon completion of the work.

NOTICE

Risk of damage to cables due to protrusion into the adjustment area. Fasten the connection cables to the frame with cable ties to prevent them from extending into the adjustment area.

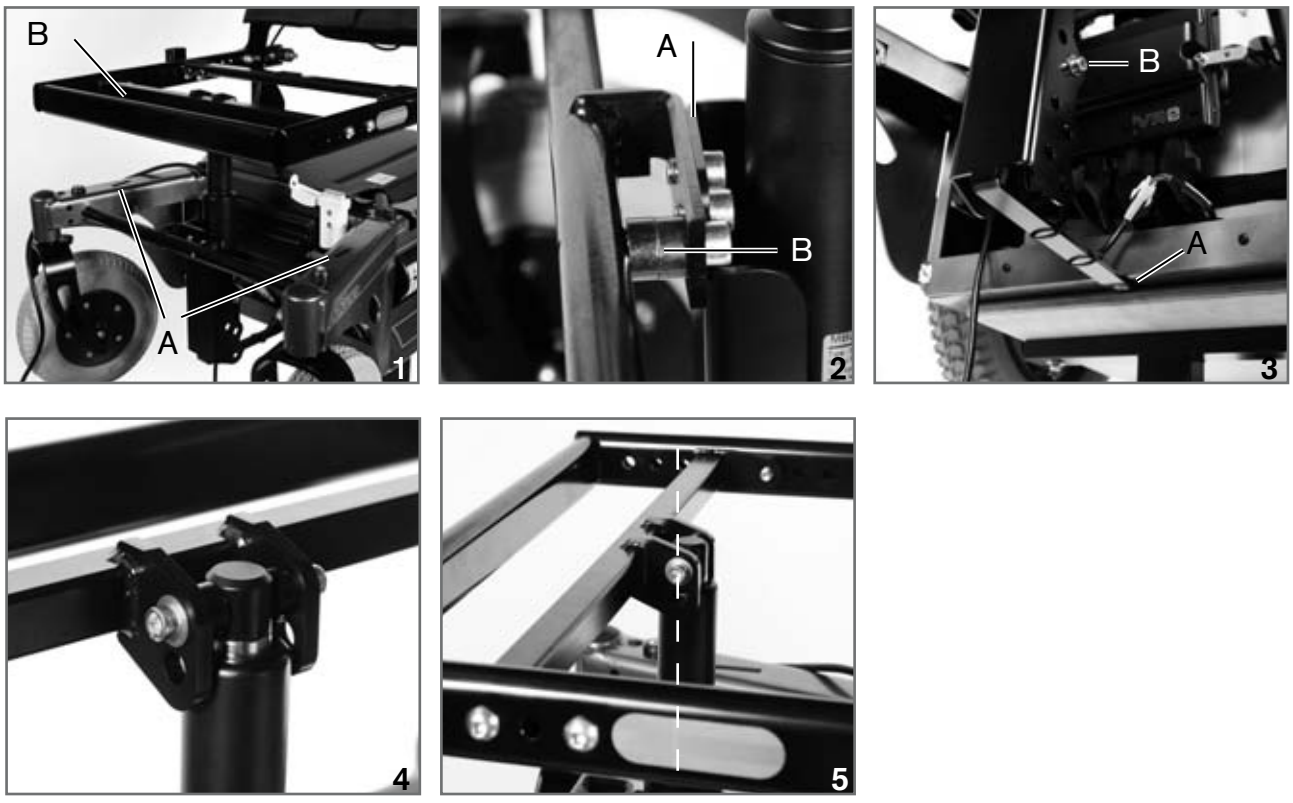


Fig. 62 Retrofitting with 20° seat tilt

6.16.3 Retrofitting with power footrests (optional)

INFORMATION

A changeover box must be installed in order for the footrest to be actuated as a third additional power function. See section 6.16.5.

The power footrests are delivered as a preassembled unit. The footrests of the power wheelchair are self-contacting.

Preparation:

❒ Remove the standard footrests and footrest adapters.

Tools:

❒ Allen wrench, size 5

❒ Ring or open-end spanner, size 13

Steps:

1. Insert/screw the footrest adapters for the electric footrests into the seat frame (fig. 63-1).
2. Insert the power footrests into the footrest adapters until they lock in place (fig. 63-2; the footrests/footrest adapters are self-contacting).
3. If required, replace the controller/control panel with the version designed for additional power functions (see section 6.4/6.8).
4. Connect the actuator for the footrest/footrests to the controller or to the changeover box:
   - as a second additional power function: connect the actuator cable to input A1/A2 (see fig. 67).
   - as a third additional power function: connect the actuator cable to the Y-connector on the changeover box (fig. 65-2). Another additional power function can be connected to the other input on the Y-connector.
5. Check the functioning of the power footrests.

Properly reassemble all components upon completion of the work.

NOTICE

Risk of damage to cables due to protrusion into the adjustment area. Fasten the connection cables to the frame with cable ties to prevent them from extending into the adjustment area.

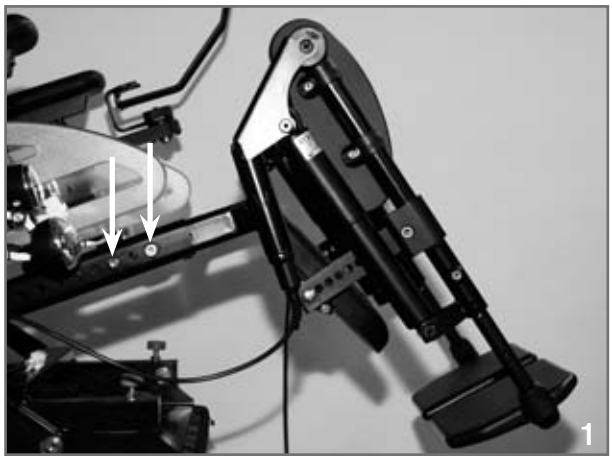


Fig. 63 Retrofitting with 20° seat tilt

6.16.4 Retrofitting with seat height adjustment (optional)

The seat height adjustment feature is supplied as a preassembled unit (fig. 64-1).

Preparation:

❒ Remove the old seat (including the seat plate and seat frame).

Tools:

❒ Ring or open-end spanner, size 13

❒ Allen wrench, size 5

Steps:

1. Mount the front seat brackets (fig. 64-2).
2. Mount the rear seat brackets using the distance bushings (fig. 64-3).
3. Mount the bearing plate to the seat height adjustment mounting unit to accommodate the patient's seat depth.
4. Mount the seat height adjustment mounting unit on to the wheelchair frame with the seat brackets.
5. Fasten the additional cables to the frame with cable ties to prevent them from extending into the adjustment range.

INFORMATION

The cables are routed from the opening of the top expansion bellows plate along the angled cable tracks on the right and left (fig. 64-4) to the controller. Make sure the cable length is sufficient for all seat heights and the cables cannot be crushed.

6. Adjust the metal tab of the microswitch (fig. 64-5). The adjustment is made by changing the length and moving the metal tab to the right or the left. Make sure the metal tab cannot crush the microswitch.

INFORMATION

As soon as the seat height adjustment unit is moved out of the lowermost position, the microswitch is enabled by the metal tab. This reduces the speed (activation of creep speed).

7. If required, replace the controller/control panel with the version designed for additional power functions (see section 6.4/6.8).
8. Connect the actuator to the controller (input A1 or A2; see fig. 67).
9. Install the seat back on the bearing plate (see section 6.10.1).
10. Complete the seat with side panels, footrests, etc.
11. Attach the bellows.
12. Check the functioning of the power seat height adjustment feature.

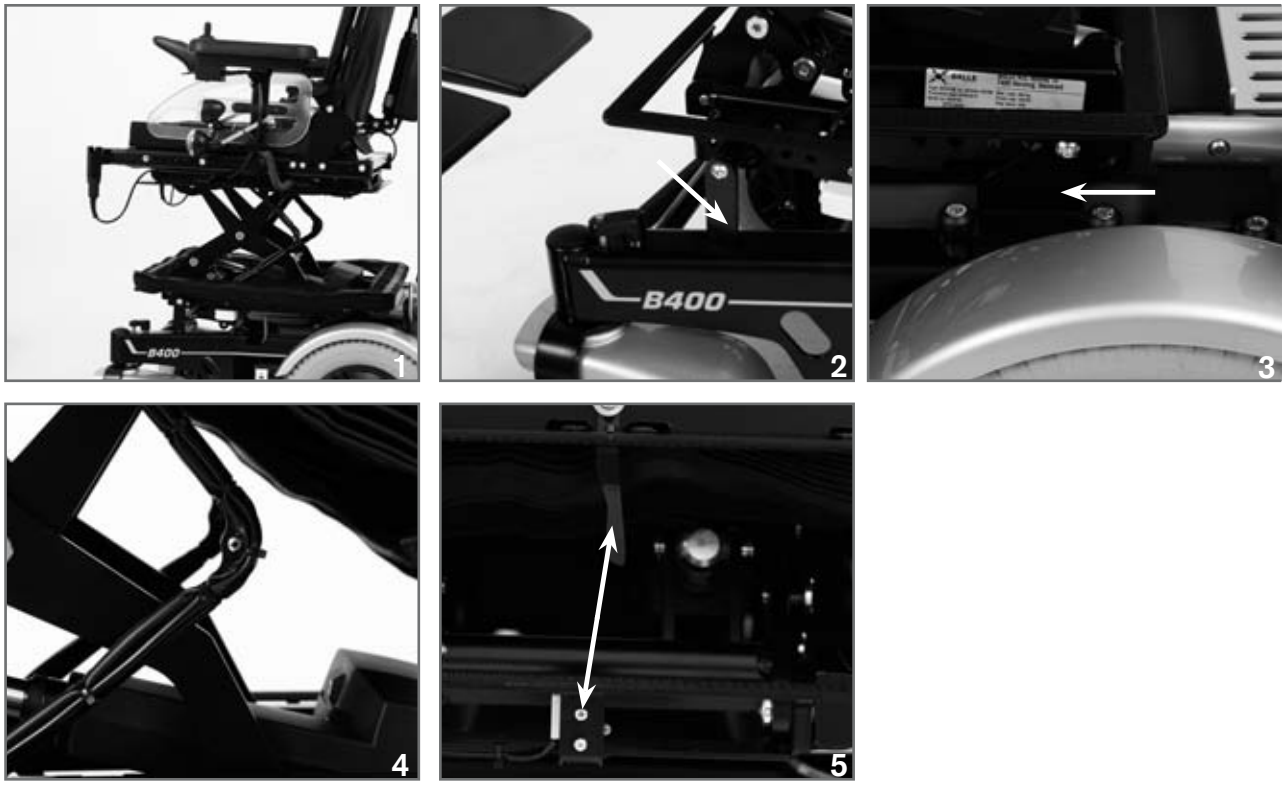


Fig. 64 Retrofitting with seat height adjustment unit

6.16.5 Installing the changeover box

The changeover box for 493T65=SK012 power options is a switchable Y-cable enabling the connection of two additional power functions to an actuator input. The changeover box is required for actuation of a third additional power function.

Depending on the position of the switch on the Y-cable the first or another additional power function can be actuated via the control panel.

Preparation:

❒ Remove/set aside the control panel.

Tools:

❒ Allen wrench, size 3

Steps:

1. Take the side panel out of the bracket on the control panel side.
2. Loosen the set screws on the sliding nuts on the control panel holder.
3. Slide the changeover box on to the profiled rail and secure the sliding nut (fig. 65-1).
4. Attach the control panel holder again.
5. Connect the Y-cable to input A1 (see fig. 67).
6. Check the electrical functions.

Now a separate additional power function (e.g. power footrest, power seat tilt) can be connected to each connector on the Y-cable (fig. 65-2) and actuated.

6.16.6 Attaching the Y-splitter

The 493T32=SK197 Y-splitter is a supplementary part for the changeover box. It is inserted into a socket on the Y-cable.

Now two additional power functions (e.g. left and right footrests) can be connected to this connector and actuated in parallel.

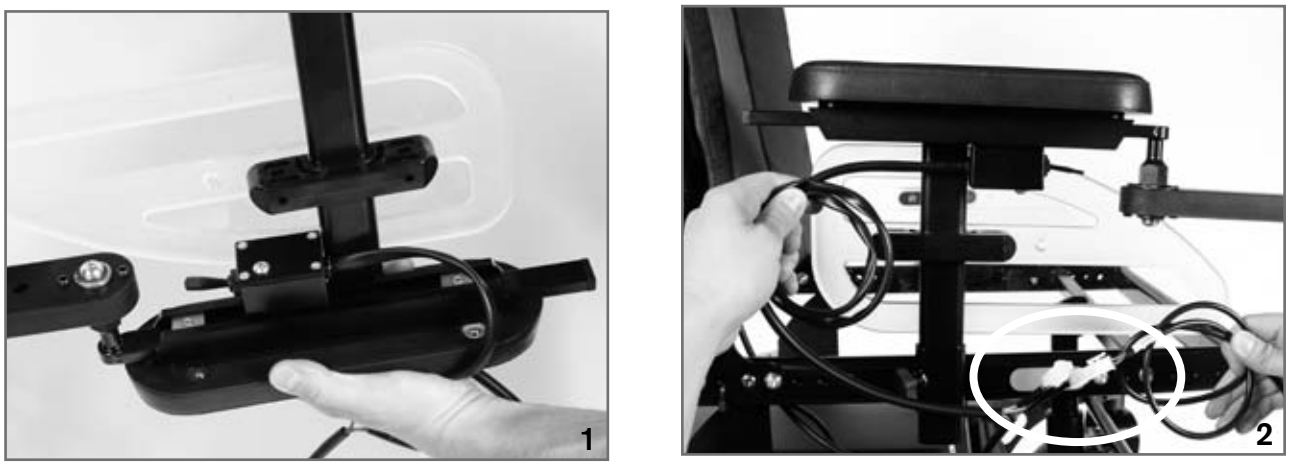


Fig. 65 Installing/connecting changeover box with Y-cable

6.17 Retrofitting with attendant control

The attendant control (fig. 66-1) is supplied as an assembly kit.

Tools:

❒ Allen wrench, size 3/4

❒ Ring or open-end spanner, size 8

❒ Flat screwdriver

Steps:

1. Remove the upper two screws on the back upholstery.
2. Position the bracket and install with the supplied screws and washers (fig. 66-2).
3. Mount the swivel arm with clamp ring (fig. 66-3) on to the bracket.

4. Screw on the swivel arm with the supplied clamp lever (fig. 66-4).
5. Slide the control panel holder on to the swivel arm and tighten screw (fig. 66-4).
6. Mount the attendant control to the control panel holder using four screws and fan washers (fig. 66-5).
7. Thread the cable of the attendant control through the back upholstery and along the side of the battery cover to the controller (fig. 66-6).
8. Disconnect the control panel cable from the controller.
9. Insert the attendant control cable in the same position.
10. Insert the attendant control cable into the cable guide on the attendant control.
11. Check the control functions.

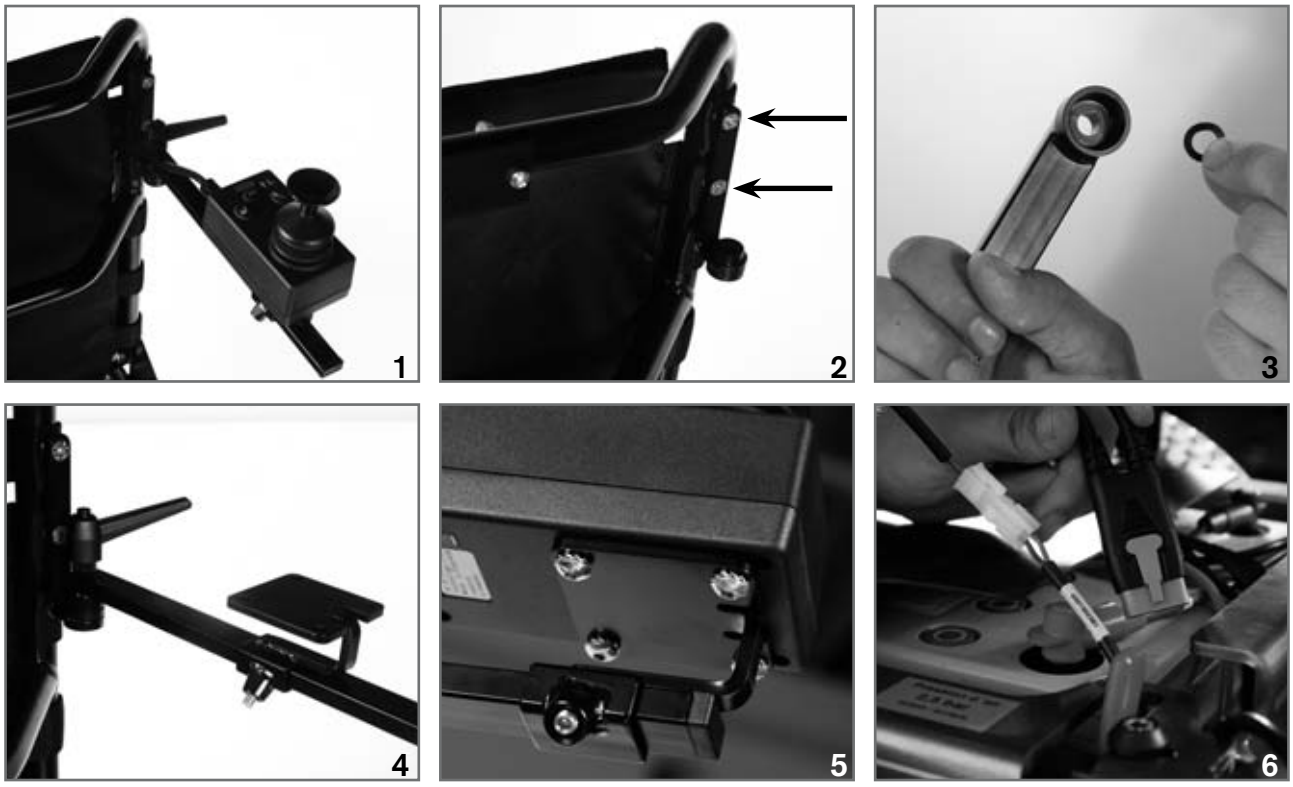


Fig. 66 Retrofitting with attendant control

7 Diagnostics

NOTICE

Risk of damage due to unauthorised service. Repairs which have been carried out improperly or poorly may result in unsafe operation of the power wheelchair. Troubleshooting may thus only be carried out by authorised specialist dealers possessing solid knowledge of electronic controllers from Ottobock. Ottobock assumes no liability for any damage which can be attributed to improperly or poorly carried out repairs.

INFORMATION

Experience has shown that problems with the electrical system on the wheelchair are frequently due to errors and defects in the plug connections and cabling. These areas should therefore always be examined first.

The display of errors is carried out either through flashing signals on the "battery capacity" LED display (see section 7.2) or with the help of the hand-held programming device (see section 7.3). The hand-held programming device can more precisely record the errors with the help of error codes.

Using these instructions you can assign the displayed errors to any of ten different error types. This allows information about the possible root causes as well as repairs to be deduced.

All faults that have occurred are saved in a list and can be called, e.g., during a general overhaul of the B400 (see section 8.4.4). The saved data can be used to determine future service and maintenance intervals, for example.

7.1 Troubleshooting steps

To ensure efficient and successful troubleshooting proceed as follows:

- ❒ Ascertain whether there is a concrete factor triggering the error or whether the error occurs sporadically.
- ❒ Determine the error type.
- ❒ Check the table of error types (section 7.3, table 7) to determine the possible cause and carry out the recommended tests and corrective actions.

7.2 Troubleshooting via "battery capacity" LED display

Error messages are displayed via the "battery capacity" LED display as follows:

LED display	Meaning	Remedy
Rapid flashing	The control system detects an error.	Interpret the flashing signals (see table 6). Connect the programming device, read off the error code (see table 7) and determine the error type (see table 8).
Slow flashing	The control system does not register an error trigger, but an error was possibly triggered before. INFORMATION The fewer LEDs are flashing the more the battery has been discharged.	Read the diagnostics report from the control system and determine the error type (see section 7.3). Charge the batteries.
Display continuously illuminated	The control system does not register an error trigger, but an error was possibly triggered before.	Read the diagnostics report from the control system and determine the error type (see section 7.3).
Display not illuminated	The control system is not being supplied with power.	Check battery charge level Check all connections between the battery and the control system. If the connections are alright, the power module may be defective.

Table 5 Identifying the LED error message

The following list describes the error messages/flashing signals in the "battery capacity" LED display field as well as the possible causes and remedies:

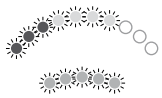
Flashing LED	Error/Warning	Cause	Remedy
	Low battery capacity Battery cable faulty/ defective connection to battery	Battery deep discharge	Charge battery Check connection to battery; charge battery if connection good
	Defective cables on left motor Defective motor	e.g. defective plug connection	Check connections to left motor Check motor
	Short circuit in connection from battery to left motor	e.g. cable break	Check connection of battery to left motor
	Defective cables on right motor Defective motor	e.g. defective plug connection	Check the connections to the right motor Check motor
	Short circuit on the battery connection to the right motor	e.g. cable break	Check battery connection to the right motor
	Driving function blocked due to external factors	Battery charger may be connected	Disconnect battery charger
	Joystick error	Joystick is not in zero position when the unit is turned on	Position joystick in home position prior to switch-on
	Controller error		Check all connections
	Brake release error	Brake disabled	Check motor brakes Check connections to controller
	Battery overvoltage	Loose battery contacts	Check connector contacts
	Communication error between control panel (joystick) and controller	Defective cable; loose plug connection	Check connections

Table 6 LED error types, causes and remedies

7.3 Troubleshooting via hand-held programming device (also see section 8.3)

INFORMATION

The programming device may only be connected to the control system if the LED display is flashing. Should the programming device be connected before flashing occurs the error code will not be displayed.

The following table lists the error codes and types as well as references to detailed descriptions of the respective errors. The error codes as well as the causes and remedies are described in table 9.

Error code	Error type	Description number	Description (for more details see table 9)
1320	–	(13)	Current limitation active
1505	9	(9)	Error in electromagnetic brake, left
1506	9	(9)	Error in electromagnetic brake, right
1600	10	(10)	High battery voltage
1E03	Charge the battery	(6)	Battery charger connected
1E04	6	(13)	
1E05	Charge the battery	(14)	
2C00	1	(1)	Low battery voltage
2C02	–	(1)	Shutdown due to low battery voltage
2F00	User	(7) (11)	Possible joystick error Joystick displaced upon switch-on
3B00	2	(2)	Left motor disconnected
3C00	4	(4)	Right motor disconnected
3D00	3	(3)	Cable error, left motor
3D01	3	(3)	Cable error, left motor
3E00	5	(5)	Cable error, right motor
3E01	5	(5)	Cable error, right motor
4401	8	(8)	Control system error
5400	7 + S	(12) Error S	(12): communication error (S): Flashing LEDs for speed display
7100	–	(7)	Joystick error
7101	–	(7)	Joystick error
7102	7	(7)	Joystick error
7103	7	(7)	Joystick error
7104	7	(7)	Joystick error
7147	User	(11)	Joystick displaced upon switch-on
7902	–	(14)	High temperature
Other codes	7 or 8	(7) or (8)	Possible control system error

Table 7 List of error codes

No.	Cause/Remedy
(1)	**Low battery voltage** The control system registers drop in battery voltage to below 16 V. Check battery level and connections to control system. If error persists the power module may be defective. INFORMATION Should error code 2C02 appear the control system creates a report of the frequency at which shutdown occurs due to low battery voltage.
(2)	**Left motor disconnected** The control system registers disconnection of the left motor. Check left motor and its plug connections/cables. If error persists the power module may be defective. INFORMATION If the outputs on the left and right motors were programmed with left and right mixed up this section relates to the right motor. If you have any questions please contact Ottobock.
(3)	**Cable error, left motor** The control system registers an error in the cables on the left motor, in particular if there is a short circuit in the connection from the motor to the battery. Check plug connections and cables on left motor. If error persists the power module may be defective. INFORMATION If the outputs on the left and right motors were programmed with left and right mixed up this section relates to the right motor. If you have any questions please contact Ottobock.
(4)	**Right motor disconnected** The control system registers disconnection of the right motor. Check right motor and its plug connections/cables. If error persists the power module may be defective. INFORMATION If the outputs on the left and right motors were programmed with left and right mixed up this section relates to the left motor. If you have any questions please contact Ottobock.
(5)	**Cable error, right motor** The control system registers an error in the cables on the right motor, in particular if there is a short circuit in the connection from the motor to the battery. Check plug connections and cables on right motor. If error persists the power module may be defective. INFORMATION If the outputs on the left and right motors were programmed with left and right mixed up this section relates to the left motor. If you have any questions please contact Ottobock.
(6)	**Battery charger is connected** The control system recognises a connected external battery charger. Disconnect battery charger. If error persists the joystick module may be defective.
(7)	**Possible joystick error** The control system recognises a problem with the internal joystick or if a communication error exists between the joystick module and the power module. INFORMATION Replacement of the joystick and all subsequent tasks may only be carried out by individuals who have been authorised by the wheelchair manufacturer. **7100/7101:** Loss of communication connection to joystick. Check joystick cable, ribbon cable on the joystick, connections and associated sockets. **7102:** Loss of power to joystick. Check joystick cable, ribbon cable on the joystick, connections and associated sockets. **7103/7104:** Internal error trigger. Check joystick cable, ribbon cable on the joystick, connections and associated sockets. Check whether the cable is connected correctly to the joystick and the PCB.

No.	Cause/Remedy
(8)	**Possible control system error** The control system registers an internal problem. Repair of the control system may only be carried out by an authorised specialist.
(9)	**Electromagnetic brake error** The control system registers a problem with the electromagnetic brakes or the connections to them. **1505:** Error triggering by left brake **1506:** Error triggering by right brake Check connections and electromagnetic brake. If error persists the power module may be defective.
(10)	**High battery voltage** The control system registers a battery voltage of more than 35 V. Most frequent causes: overcharging of battery or faulty connections between control system and batteries. Check batteries and their connections. If error persists the power module may be defective.
(11)	**Joystick displaced upon switch-on** Most frequent cause: joystick not in home position when system switched on. Make sure the user does not operate the joystick prior to system switch-on. If the error persists check the points in section 7.
(12)	**Communication error** Most frequent cause: defective cable between power and joystick modules. Check cable for damage and if necessary replace. If error persists the power or joystick module may be defective. INFORMATION Replacement of the connecting cable may only be carried out by individuals who have been authorised by the wheelchair manufacturer. INFORMATION Details about cable replacement can be found in the document SK 77898, "VR2 SERIES WHEELCHAIR CONTROL SYSTEM; OPERATION, INSTALLATION & PROGRAMMING". If error persists the joystick module may be defective.
(13)	**Current limitation active (indicator function)** The control system operates above the current limitation threshold for a longer time than the current limitation time. The information shows the service technician that the control system was operating outside the programmed range.
(14)	**High temperature (indicator function)** The control system heats up to a temperature above the defined threshold. Driving is interrupted until the controller has cooled. Each occurrence of controller overheating is recorded in the system report.

Table 8 Error types, causes and remedies

7.4 Additional errors (not displayed)

This category includes errors which are not shown by the hand-held programming device or the LED display.

Reasons for this can be that the control unit cannot be switched on, the error is not severe enough or the control system cannot recognise the error for other reasons.

Error	Possible cause	Remedy
Control system does not switch on	There is no connection between the battery and the control system (if error persists the power module may be defective).	Check plug connection/power module.
	Faulty cable connection between power and joystick modules (if the connection is functioning one of the modules may be defective).	Check plug connection/ Check modules.
Wheelchair only moves slowly	The control system was not programmed properly.	Program the speed.
	A speed-limiting function is active.	Switch off the limiting function.
	Defective motor or defective brake.	Check or replace the motor or brake.
Wheelchair not driving straight	Motor or brake error.	Check or replace the motor or brake.
Motor or one brake is hot	Motor or brake error.	Check or replace the motor or brake.
Battery is discharging too quickly	Use of old or damaged batteries.	Check the battery and replace if necessary.
	Use of a defective or unsuitable battery charger (check operation of battery charger).	Replace battery charger.
	Use of incorrect batteries.	Select an appropriate battery type by referring to the instructions for use.
	Motor is blocked or a brake is jammed.	Replace motor.

Table 9 Additional errors

8 VR 2 wheelchair control – Installation and programming

8.1 Overview

The VR2 control offers the possibility of showing causes of error messages on the display.

Root causes of faults in the drive and in the power options are identified through flashing LEDs of the control unit (see section 7.2).

Changes in parameters can be made with the hand-held programming device or via a PC software/interface cable (each of which can be ordered separately).

8.2 Installation and wiring

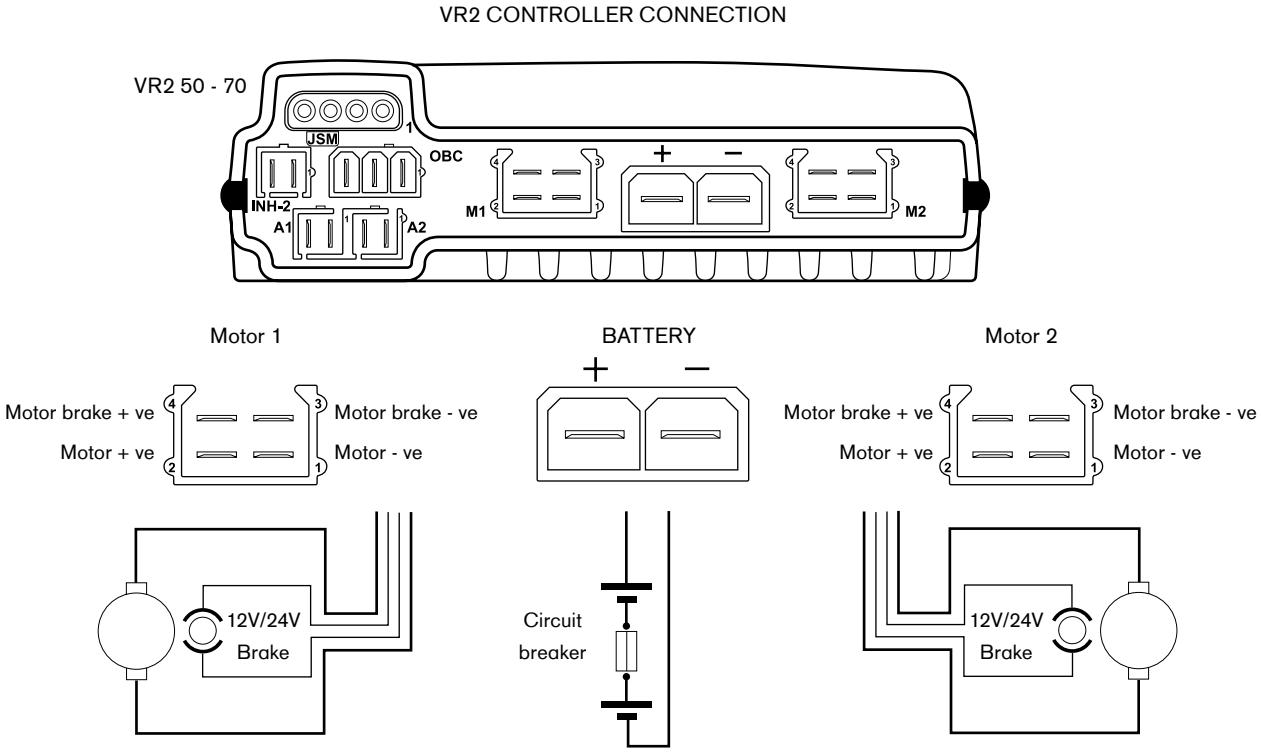


Fig. 67 Connections on controller

8.3 Programming tools

⚠ WARNING

Risk of injury due to faulty programming. Programming may only be carried out by qualified employees who are very familiar with the VR2 control. Faulty programming can lead to wheelchair settings that pose a risk to the safety of the user. Neither Ottobock nor the control manufacturer is liable for loss or damage due to modification of the factory-set control system program.

8.3.1 Hand-held programming device

INFORMATION

Please read the PP1a programming device user manual before using such a device.
Should you wish to reprogram the control system make sure you consider all limitations described in the user manual for the wheelchair.
Document all modifications for further reference.

The PP1a hand-held programming device enables access to programmable parameters for adjusting the wheelchair to the individual requirements of the patient as well as to read error reports and timer information (see section 8.4). It is connected to the control system via a connector for making changes to the program settings.

Further information regarding use of the hand-held programming device can be found in the "Programming and Diagnostics" user instructions for the PP1a hand-held programming device.

8.3.2 PC programming device

The PC programming device enables the same access as the PP1a hand-held programming device. Further information regarding use of the software packages with the VR2 control can be found in the documentation supplied with the software.

8.4 Programmable parameters

A selection of the programmable parameters available are given below. Information regarding further programming can be found in the document "VR2 SERIES WHEELCHAIR CONTROL SYSTEM; OPERATION, INSTALLATION & PROGRAMMING".

8.4.1 Speed settings

Parameter	Setting range	Description
Acceleration	Steps of one from 0 to 100	Setting of forward and backward acceleration of the wheelchair. A high value enables fast acceleration. This programmed acceleration value appears when a speed setting of 5 has been selected. Its value for other settings depends on the value of the parameter "Minimum Acceleration".
Deceleration	Steps of one from 0 to 100	Setting of the forward and backward deceleration (or brake) of the wheelchair. A high value enables rapid deceleration. This programmed deceleration value appears when a speed setting of 5 has been selected. Its value for other settings depends on the value of the parameter "Minimum Deceleration".
Turn Acceleration	Steps of one from 0 to 100	Setting of turn acceleration of the wheelchair. A high value enables fast acceleration. This programmed acceleration value appears when a speed setting of 5 has been selected. Its value for other settings depends on the value of the parameter "Minimum Turn Acceleration".
Turn Deceleration	Steps of one from 0 to 100	Setting of the turn deceleration (or brake) of the wheelchair. A high value enables rapid deceleration. This programmed deceleration value appears when a speed setting of 5 has been selected. Its value for other settings depends on the value of the parameter "Minimum Turn Deceleration".

Parameter	Setting range	Description
Forward Speed	Steps of one from 0 to 100	Setting of the minimum and maximum forward speeds of the wheelchair. A high value enables a high speed. The minimum value appears if the speed setting 1 has been selected and the maximum value appears when the speed setting 5 has been selected.
Reverse Speed	Steps of one from 0 to 100	Setting of the minimum and maximum reverse speeds of the wheelchair. A high value enables a high speed. The minimum value appears if the speed setting 1 has been selected and the maximum value appears when the speed setting 5 has been selected.
Turning Speed	Steps of one from 0 to 100	Setting of the minimum and maximum turning speeds of the wheelchair. A high value enables a high speed. If "Drive Profile 0" has been selected the minimum value appears for speed setting 1 and the maximum value appears when speed setting 5 has been selected.
Power	Steps of one from 0% to 100%	Setting of wheelchair power level. Power is understood to be the ability, e.g. to negotiate hills or overcome obstacles. If the power is set to 100% the wheelchair can be operated at its full power. Settings of less than 100% lead to lower power (performance) levels. Power settings are usually made to avoid damage to corridors and furniture when the wheelchair is being used indoors. The driving profiles can be set independently of each other; i.e. different profiles can be defined for inside and outside areas. Program example: • Maximum current = 70 A • Power (profile 1) = 100% • Power (profile 2) = 50% (i.e., the VR2 control has a level of 70 A in profile 1, but a level of 50% of 70 A = 35 A in profile 2).
Number of Drive Profiles	Profiles 0 – 5	The VR2 control can be operated with a single or with multiple driving profiles. A driving profile consists of programmable parameters such as acceleration, deceleration, turn acceleration, turn deceleration, forward speed, reverse speed and turning speed. The number of driving profiles is specified via the programmable parameter "Number of Drive Profiles". If the parameter "Number of Drive Profiles" is set to 0 there is one setting for each of the parameters listed above. The maximum speed setting of the control system can be changed using the keys for maximum speed or extension/reduction of the profiles. If the parameter setting for "Number of Drive Profiles" has a value of 2 to 5 the corresponding number of driving profiles exists and each of the listed parameters can be set separately in each profile. Then the keys for maximum speed or extension/reduction of the profiles can be used to switch between the existing profiles.
		INFORMATION Although a series of driving profiles can be set to 1, the operation of them is the same as in the case of a setting of 0. However, the maximum speed cannot be changed.

Parameter	Setting range	Description
Minimum Acceleration	1% increments of parameter "Acceleration"	Setting of minimum forward and backward acceleration of the wheelchair. This percentage acceleration value appears if the speed has been set to 1. Program example: • Acceleration = 80 and minimum acceleration = 25% • Acceleration for level 1 = 25% of 80 = 20 • Speed settings 2, 3 and 4 are linearly interpolated between 20 and 80 • Acceleration for level 2 = 35 • Acceleration for level 3 = 50 • Acceleration for level 4 = 65
Minimum Deceleration	1% increments of parameter "Deceleration"	Setting of the minimum forward and backward deceleration of the wheelchair. This percentage deceleration value appears if the speed has been set to 1. Program example: • Deceleration = 80 and minimum deceleration = 25% • Deceleration for level 1 = 25% of 80 = 20 • Speed settings 2, 3 and 4 are linearly interpolated between 20 and 80 • Deceleration for level 2 = 35 • Deceleration for level 3 = 50 • Deceleration for level 4 = 65
Minimum Turn Acceleration	1% increments of parameter "Turn Acceleration value"	Setting of minimum turn acceleration of the wheelchair. This percentage turn acceleration value appears if the speed has been set to 1. Program example: • Turn acceleration = 80 and minimum turn acceleration = 25% • Turn acceleration for level 1 = 25% of 80 = 20 • Speed settings 2, 3 and 4 are linearly interpolated between 20 and 80 • Turn acceleration for level 2 = 35 • Turn acceleration for level 3 = 50 • Turn acceleration for level 4 = 65
Minimum Turn Deceleration	1% increments of parameter "Turn Deceleration"	Setting of the minimum turn deceleration of the wheelchair. This percentage turn deceleration value appears if the speed has been set to 1. Program example: • Turn deceleration = 80 and minimum turn deceleration = 25% • Turn deceleration for level 1 = 25% of 80 = 20 • Speed settings 2, 3 and 4 are linearly interpolated between 20 and 80 • Turn deceleration for level 2 = 35 • Turn deceleration for level 3 = 50 • Turn deceleration for level 4 = 65

Table 10 Programming speed parameters

8.4.2 Setting general parameters

Parameter	Setting range	Description
Sleep Timer	1-minute steps in range 0 – 30 min	Setting of time period in which wheelchair is inactive before the control system switches off. If the time is set to 0 the system never switches off.
Joystick Throw		The program enables the maximum speed to be achieved even if the joystick is moved (deflected) slightly. This is particularly useful for wheelchair drivers with restricted hand or arm mobility.
Invert Joystick	On/Off	Setting this parameter causes the wheelchair to be moved in the opposite direction to the direction of joystick deflection. On: if the joystick is moved forward the wheelchair moves backwards. Off: if the joystick is moved forward the wheelchair moves forward. If the joystick is moved to the left or to the right the driving direction remains unchanged.
Soft Stop Rate	Steps of one from 0 to 200	Setting of deceleration value for soft stopping of the wheelchair. Soft braking of the wheelchair occurs if the VR2 control is switched off during travel.
Soft Reverse Deceleration	Steps of one from 25% to 100%	Setting of the deceleration rate when the wheelchair is stopped whilst moving backwards. This value can be set separately via the "Deceleration" parameter to prevent the wheelchair from tipping over when being driven backwards down a slope. This value is set as a percentage of the "Deceleration" parameter. A typical value is 70%.
Reverse Driving Alarm	On/Off	Setting for an acoustic warning signal output by the VR2 control when the wheelchair is moving backwards. On: an acoustic warning signal sounds. Off: the alarm is deactivated.
Lock Function Enabled	On/Off	The locking sequence can be activated to prevent the wheelchair being driven by an unauthorised person. On: the lock function is available. Off: the lock function is deactivated.
Brake Fault Detect	On/Off	Enables detection of defective power brakes or brake connections via the VR2 control. On: brake defects are detected. Off: brake defects remain undetected. INFORMATION This parameter should only be switched off if the wheelchair has no power brakes.

Table 11 Programming general parameters

8.4.3 Programming the light module

The lighting module is pre-programmed. By programming, the light module can be adapted to the respective lighting (see section 6.9).

Programmable function	Default setting	Possible adjustment
Operating voltage of lamps	24 V	12 V (lamps must correspond to the value/be changed)
Lamp power	21 W	5 W; 10 W
Detection of errors with driving direction indicators	On (control detects defect in driving direction indicator; display through rapid flashing of driving direction indicator)	Off (no error detection; only use function with use of one driving direction indicator per side)

Table 12 Programming parameters for light module

8.4.4 Reporting functions

The following functions are logged by the VR2 control and can be read with the corresponding hardware:

Function	Description
Memory Functions	VR2 is equipped with a timer and troubleshooting report function. They can be read and deleted with the help of the PP1a or PC programming device.
Read Timer	VR2 is equipped with a timer that records the hours of operation of the wheelchair. The timer starts running as soon as the joystick is moved out of the home position and stops running when the joystick returns to the home position. The timer records the number of hours for which the wheelchair is in use.
Clear Timer	With this function the VR2 control timer is reset. This function can only be used with the PCPb and PCPc versions of the PC programming device.
Read System Log	VR2 is equipped with a troubleshooting report system that saves the number of events from the last eight detected system problems. Through this the contents can be read.
Erase System Log	With this function the troubleshooting report from the VR2 control can be deleted. This function can only be used with the PCPb and PCPc versions of the PC programming device.

Table 13 Reporting functions

9 B400 maintenance and service plan

Customer:

Reuse

Yes	No

Year of manufacture:	Serial no.:

General condition of the B400

Driving report:

Areas

For all the components listed here check the functioning, setting and screw connections and look for signs of damage or deformation!

	Setting range	In good condition	Damaged	Exchange/Replace
1	**Control unit**			
	Control unit bracket			
	Control unit cable			
	Control panel			
2	**Batteries**			
	Battery cover			
	Cables			
3	**Motors**			
	Brake release			
4	**Tyres**			
	Drive wheels			
	Castor wheels			
5	**Frame**			
	Drive unit bracket			
6	**Seat**			
	Back			
	Upholstery/cushions			

	Setting range	In good condition	Damaged	Exchange/Replace
7	Power seat adjustments			
	Back adjustment (actuator, cables)			
	Seat tilt (actuator, cables)			
	Seat height adjustment (actuator, bars, cables)			
	Footrests (actuator, cables)			
8	Side panel			
	Brackets			
	Clothing protector			
	Lighting bracket			
9	Footrests			
	Brackets			
	Elevating footrests			
10	Options			
	Front lights			
	Rear lights			
	Belt			
	Kerb climber			
	Adapter for headrest			

Comments:

Maintenance carried out by:	Place/Date:	Signature:

Kundenservice/Customer Service

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